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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 5, NUMBER 19
OCTOBER 1, 1972

W72-11089 --W72-11738

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 5, NUMBER 19
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As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

THE VAPOR PRESSURE ISOTOPE EFFECT IN AQUEOUS SYSTEMS. I. H2O-D2O (-64 TO 100 DEG) AND H216O-H218O (-17 TO 16 DEG); ICE AND LIQUID. II. ALKALI METAL CHLORIDE SOLUTION IN H2O AND D2O (-5 TO 100 DEG),
Tennessee Univ., Knoxville. Dept. of Chemistry.
J. Pupezin, G. Jakli, G. Jancso, and W. A. Van Hook.
Journal of Physical Chemistry, Vol 76, No 5, p 743-762, 1972. 6 fig, 11 tab, 91 ref. OWRR-012-TENN (3).

Descriptors: *Vapor pressure, *Isotope studies, *Aqueous solutions, Heavy water, *Thermodynamic behavior.
Identifiers: *Vapor pressure isotope effect, Osmotic coefficients, Activity coefficients.

High precision data are reported over a broad temperature range for the vapor pressure isotope effects displayed by the systems H216O-H218O; H2O-D2O; H2O-D2O-NaCl (1.1, 2.9, 4.0, and 5.5 m); H2O-D2O-KCl (3.5 and 4.5 m); H2O-D2O-CsCl (1.0, 3.0, 4.5, and 6.0 m); and H2O-D2O-LiCl (3.0, 5.0, 7.0, and 15.0 m). Here m is the concentration in aquamolality. The results are summarized with analytical expressions reported in the text and are good to plus or minus 0.0003 ln R unit or better (R is the isotopic pressure ratio). The analytical expressions for the temperature dependence of the vapor pressure isotope effects reported are regarded as the best now available. For the salt solutions expressions for the change in the vapor pressure isotope effect as a function of concentration and temperature and expressions for the isotope effects on the excess thermodynamic properties of solution are extracted from the data (including isotope effects on the osmotic and the activity coefficients, and the excess free energies, enthalpies, entropies, and heat capacities of solution). The isotope effects on the standard thermodynamic properties of solution are also determined where possible (NaCl and KCl).
W72-11310

02. WATER CYCLE

2A. General

THE MOUTAIN SNOWPACK AS AN ENVIRONMENTAL INDICATOR,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 02C.
W72-11127

CATALOG OF INTERNATIONAL HYDROLOGICAL DECADE STATIONS AND NETWORKS IN THE UNITED STATES.
National Committee for the International Hydrological Decade, Washington, D. C.
For primary bibliographic entry see Field 07A.
W72-11280

MATHEMATICAL MODELLING IN HYDROLOGY,
Geological Survey, Fort Collins, Colo. Water Resources Div.
D. R. Dawdy, and G. I. Kalinin.
International Association of Scientific Hydrology Bulletin, Vol 16, No 4, p 25-35, December 1971. 133 ref.

Descriptors: *Mathematical models, *Systems analysis, *Simulation analysis, *Reviews, *Bibliographies, Stochastic processes, Statistical models, Parametric hydrology, Mathematical studies, Numerical analysis, Synthetic hydrology, International Hydrological Decade.

Achievements of theoretical and applied hydrology are closely related to the application of physical and mathematical analysis. Recent development of computation techniques and the construction of both analog and digital computers are important in the development of such branches of hydrology as hydrological forecasting, hydrological calculations, theory of water resources control, and mathematical processing of observation data. Determination of the branches of hydrology and the particular problems of each which can be most efficiently solved by the above methods, the principal directions of the development of physical and mathematical methods in hydrology, and experience in the methods of solving theoretical and applied problems in hydrology are reviewed. The most modern, powerful methods do not necessarily require the use of powerful computers. Rather, quite often an awareness of the mathematics available enables the hydrologist to choose that level of approximation necessary to solve his problem within the level of accuracy and cost determined by the resources available to him. These developments complement developments in other fields, such as the design and analysis of experimental results, proper collection of data, and problems of network design. The method of arriving at the solution of a particular problem may be more important than the particular mathematical tool used. This makes it even more necessary to be aware of mathematical advances in order to remain abreast of the powers which the latest methods present to the modern hydrologist for the solution of his problems. (Knapp-USGS)
W72-11292

CALCULATION OF EXPECTED VALUES OF OBSERVABLES IN SOME PROBLEMS OF STATISTICAL GEOMORPHOLOGY,
Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
A. K. Ghosh, and A. E. Scheidegger.
International Association of Scientific Hydrology Bulletin, Vol 16, No 4, p 57-61, December 1971. 1 tab, 8 ref.

Descriptors: *Statistical models, *Geomorphology, Parametric hydrology, Model studies, Topography, Drainage patterns (Geologic), Stochastic processes.
Identifiers: *Statistical geomorphology.

In statistical hydrology, three different methods have been used to calculate the expected values of observable quantities in an ensemble. The first is to use an observable as a parameter to characterize the states of the ensemble and then to calculate the average value of the observable over all possible states; this is the expected value. The second method is to use an observable as a parameter to characterize the states and then to designate the most probable value of the observable as the expected value; this is known as the minimum-variance principle. The third method is to use a parameter different from an observable to characterize the states and then to take the value of the observable for the most probable state as the expected value. Of all these different methods, only the first one is, in principle, physically correct. This study was designed to find the situations where methods other than the first can be used to calculate the expectation values of observables. This can be done only in those situations where all of the following conditions hold: the number of parameters used to characterize the states is finite; these parameters are either the same as the observables or are explicitly related to the observables; and each of the parameters has a symmetrical and unimodal probability distribution. The cases where the minimum variance principle is valid are thereby delineated. (Knapp-USGS)
W72-11294

SOME THOUGHTS ON ESTIMATING SPILLWAY DESIGN FLOOD,
Resources Research Centre, Ottawa (Ontario).
A. K. Biswas.
International Association of Scientific Hydrology Bulletin, Vol 16, No 4, p 63-72, December 1971. 5 tab, 44 ref.

Descriptors: *Flood forecasting, *Design flood, *Statistical methods, *Spillways, Design flow, Statistics, Peak discharge, Cost-benefit analysis, Rational formula.
Identifiers: *Spillway design flood.

There is no universally acceptable technique available to estimate the magnitude and frequency of floods. The rational method, empirical formulae and regional analysis all have restrictions. The remaining approaches are deterministic, using design precipitation maxima and probabilistic, the latter using streamflow data to calculate frequencies. The concepts of design maxima and the fitting of statistical distributions to flood frequencies are discussed in detail. A more logical cost/benefit approach is required for decision making in spillway design. (Knapp-USGS)
W72-11295

CONTROL OF THE DAILY WATER LEVEL DATA--TEST BY RELATING REDUCED LEVELS (CONTROLE DES COTES HYDROMETRIQUES JOURNALIERES--TEST DU RAPPORT DES COTES REDUITES),
Institut Royal Meteorologique de Belgique (Brussels). Hydrology Section.
F. Bultot, G. L. Dupriez, and J. Seyvert.
International Association of Scientific Hydrology Bulletin, Vol 16, No 4, p 73-82, December 1971. 2 fig, 4 tab.

Descriptors: *Water levels, *Stream gages, *Networks, *Calibrations, *Statistical methods, Streamflow, Statistics, Stage-discharge relations, Data collections, Data processing.
Identifiers: *Data quality control.

A statistical test reveals automatically any doubtful water levels in a data collection and detects sudden or gradual modifications of the streamflow. Each hydrometric station in a catchment area, homogeneous as to climatic conditions, is compared with a reference station. For this purpose ratios of the daily reduced water levels of the station under examination are compared to the corresponding levels of the reference station. The reduction of the daily water stages is achieved by a fictitious shift of the scale, so that the mean yearly water level is placed at a predetermined level (the same everywhere) and by a scale change to make the range delta (the difference between the largest and the smallest monthly water levels) equal to that of the reference station. The daily ratios of the reduced water levels are consequently approximately unity either with high or low water. When a daily ratio deviates too much from the mean monthly ratio, the corresponding water level is considered doubtful and must be verified. If the running mean monthly ratios do not remain approximately uniform but change, it is because the streamflow is disturbed and the reason for this disturbance must be investigated. The test, used in a converse way, can also be satisfactorily used for filling in gaps in the observational data. (Knapp-USGS)
W72-11296

AUTOMATIC DETECTION OF WATER-BORNE FLUORESCENT TRACERS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 07B.
W72-11297

THE GROUNDWATER FLOW SYSTEM IN THE DELMARVA PENINSULA,
Delaware Univ., Newark. Water Resources Center.
J. R. Mather, and R. D. Varrin.
Available from the National Technical Information Service as PB-210 810, $3.00 in paper copy, $0.95 in microfiche. Delaware Water Resources

Center Research Project Technical Completion Report, January 1972. 18 p. A-004-DEL (5).

Descriptors: *Water balance, Small watersheds, Hydrologic data, *Climatic data, *Analog models, *Groundwater movement, Aquifer management, Saline water intrusion, Aquifer systems, *Geologic formations, Subsurface mapping.
Identifiers: Delmarva peninsula.

Evaluation of many years of monthly and daily climatic water balances at locations on the Delmarva peninsula has provided basic data on the time and space variations of different climatic and hydrologic factors. This information has been utilized in various studies involving evapotranspiration, runoff, and soil moisture storage and as input data for analog models. Detailed topoclimatic analyses of several small watersheds have shown the relation among climate, soils, vegetation, topography, and hydrologic factors. Such studies must form the basis for multi-choice decision-making in the planning and management of water resources. Groundwater analog models, a vertical and a horizontal viscous flow and two electric R-C networks, were used to analyze specific flow problems in the Delmarva peninsula. These included flow in multiaquifer wells, multiple well hydraulics, salt-water encroachment and optimum pumping of aquifers. The results are being utilized in the proper allocation of the groundwater resources. A geologic cross section of the Delmarva peninsula showing stratigraphic correlation and aquifer distribution has been published.
W72-11309

A GEOGRAPHIC ANALYSIS OF HYDROLOGIC RESPONSE IN THE SOUTHEASTERN UNITED STATES,
Franklin Coll. of Arts and Sciences, Athens, Ga. School of Forest Resources.
J. F. Woodruff, and J. D. Hewlett.
Available from the National Technical Information Service as PB-210 945, $3.00 in paper copy, $0.95 in microfiche. Completion report 1972, 59 p., 8 fig, 8 tab, 11 ref. OWRR A-018-GA (1).

Descriptors: *Hydrologic properties, *Storm runoff, *Precipitation, *Land use, *Soil physical properties, Geomorphology, Basins, Porosity, Permeability, Runoff, Hydrographs, Storage, Southeast U.S.

Relationships between hydrologic response, storm discharge volumes and the physical and land use properties of 21 small watersheds in the eastern United States were analyzed by multiple regression. The best correlations achieved were with the log of discharge of the 20 largest storm flows, storm precipitation, area in uplands, area in urban land use in valley bottoms and a soil factor. Analyses using these parameters explained 74 percent of the variation in storm flow for 11 basins in the same climatic region. The principal effect of geomorphic basin factors is on peak flows rather than volumes. The basin is adjusted in its physical attributes to the larger storm events. The study suggests that failure to identify definitely any single basin attribute or set of parameters controlling storm discharges may indicate that basin morphology and land use have an inconsequential affect upon discharge; that the study failed to isolate and measure the significant basin characteristics; that basin form and land use do have an affect upon the storm discharge characteristics but that the combination is peculiar to each basin; and that no single or set of attributes is significant for all basins. The latter is supported by the fact that no valid universal prediction equation could be written but that significant levels of prediction were achieved for limited areas and storm situations. (Conway-Georgia Tech)
W72-11312

A COMPUTER MODEL OF THE TIDAL PHENOMENA IN COOK INLET, ALASKA,
Alaska Univ., Fairbanks, Inst. of Water Resources.
For primary bibliographic entry see Field 02L.
W72-11355

WATER TABLE INVESTIGATION IN THE MESILLA VALLEY,
New Mexico State University. University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02F.
W72-11387

2B. Precipitation

THE MOUTAIN SNOWPACK AS AN ENVIRONMENTAL INDICATOR,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 02C.
W72-11127

SNOWPACK ACCUMULATION IN RELATION TO TERRAIN AND METEOROLOGICAL FACTORS IN SOUTHWESTERN MONTANA,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 02C.
W72-11128

METEOROLOGICAL DATA, 1950-1970,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
For primary bibliographic entry see Field 07C.
W72-11281

REPORT ON PRECIPITATION,
Institute of Hydrology, Wallingford (England).
J. C. Rodda.
International Association of Scientific Hydrology Bulletin, Vol 16, No 4, p 37-47, December 1971. 140 ref.

Descriptors: *Rain gages, *Networks, *Calibrations, *Reviews, *Bibliographies, International Hydrological Decade, Precipitation gages, Precipitation (Atmospheric), Rainfall, Gaging stations.

National IHD programs include studies of precipitation, measurement, network design, frequency of intense rainfall, and assessment of probable maximum precipitation. Outside the IHD, work on precipitation is being carried out in a variety of disciplines: ecologists are studying the nutrient supply in rain, the occurrence of heavy rain, hail and its suppression, and how precipitation interferes with the propagation of microwaves. Subjects that are considered most central to hydrology are reviewed. Although precipitation measurement has a long history and a voluminous literature, awareness of the significance of the conventional type of instrument's shortcomings has grown only during recent years. It is now being recognized that measurements of precipitation, particularly rainfall, are neither reliable nor accurate and that hydrologists have been misled in assuming that they are. None of the other networks of hydrological instruments can match those employed for assessing the distribution of precipitation in terms of number of gages and length of records. No other records are used so extensively, not only in hydrology but also in allied fields. No other records are as readily accepted as being correct when in fact they are not. Some of the topics that continue to demand the attention of research workers are: measurement at a point, networks, areal relations, and space time analyses. (Knapp-USGS)
W72-11293

MEASUREMENT OF PRECIPITATION IN THE CHIRCHIK-KELES INTERFLUVE (K VOPROSU O VYCHISLENII OSADKOV V CHIRCHIK-KELESSKOM MEZHDURECH'YE),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
S. I. Doronina.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 42-52, 1970. 2 fig, 8 tab, 6 ref.

Descriptors: *Precipitation (Atmospheric), *Precipitation gages, *Measurement, *Interfluves, Water year, Water balance, Wetting, Winds, Wind velocity, Evaporation, Moisture deficit, Seasonal, Topography, Elevation, Equations.
Identifiers: USSR, *Soviet Central Asia, Tretyakov precipitation gages, Isohyetal lines.

Calculation of precipitation totals in the 2,395-sq-km area between the Chirchik and Keles Rivers in northern Soviet Central Asia for three consecutive water years (October 1, 1962 to September 30, 1965) was based on data of 27 meteorological stations ranging in elevation from 203 m to 1,154 m. Inaccuracy of Tretyakov precipitation gages requires corrections to obtain true precipitation totals for all stations in the area. The average correction applied to measured values for these water years was 15.4%, which included 5.8% for wetting, 7.4% for wind, and 2.2% for evaporation. Total precipitation in the interfluve for the 1962-63 water year was 469 mm and for the 1963-64 and 1964-65 water years--506 mm and 262 mm, respectively. (Josefson-USGS)
W72-11454

ODROP--OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM,
Weather Science, Inc., Norman, Okla.
For primary bibliographic entry see Field 03B.
W72-11657

STORM RAINFALL VARIABILITY OVER CONNECTICUT,
The Center for the Environment and Man, Inc., Hartford, Conn.
J. W. Wilson, and M. A. Atwater.
Journal of Geophysical Research, Vol 77, No 21, p 3950-3956, July 20, 1972. 5 fig, 20 ref.

Descriptors: *Rainfall, *Precipitation (Atmospheric), *Variability, *Connecticut, Topography, Networks, Rain gages, Data collections, Distribution patterns, Meteorological data, Meteorology, Climatology.
Identifiers: *Rainfall variability.

Storm rainfall variability over Connecticut was investigated by using data from the 66 cooperative rain gages of the National Weather Service supplemented by 70 volunteer stations. The analysis concentrated on large-scale stratiform type rainstorms. Much of the observed rainfall variability within storms can best be explained by variations in terrain. A minimum in rainfall generally occurs in the Connecticut River valley and along the coastal plain and a maximum on the windward side of the hills. The wind direction at hilltip level is an important factor in explaining differences in the rainfall pattern between storms. More upper-air stations and more frequent soundings would be needed to assess the importance of other atmospheric variables in influencing the effectiveness of topography as a modifier of precipitation patterns. The results emphasize the importance of topography, even in regions with small elevation differences, when attempts are being made to evaluate man's planned or inadvertent modification of precipitation. (Knapp-USGS)
W72-11668

2C. Snow, Ice, and Frost

FORMATION AND DISTRIBUTION OF MAGNESIUM BICARBONATE WATERS IN MESOZOIC BASINS OF EASTERN TRANSBAYKAL (NEKOTORYYE VOPROSY RASPROSTRANENIYA I FORMIROVANIYA GIDROKARBONATNYKH MAGNIYEVYKH VOD V MEZOZOYSKIKH VPADINAKH VOSTOCHNOGO ZABAYKAL'Y A),
Irkutskii Gosudarstvennyi Universitet (USSR).

For primary bibliographic entry see Field 02K.
W72-11117

THE MOUTAIN SNOWPACK AS AN ENVIRONMENTAL INDICATOR,
Montana State Univ., Bozeman.
A. B. Super.
Available from NTIS-Springfield, Va, 22151 as AD-735 696 $3.00 paper copy; $0.95 microfiche. Montana State University Final Contract Report, September 1971. 17 p, 3 ref. DAHC 04-67-C-0058.

Descriptors: *Snowpacks, *Mountains, *Montana, *Snow surveys, *Meteorological data, Topography, Remote sensing, Temperature, Snow cover, Depth, Water equivalent, Winds, Elevations, Slopes, Climates.
Identifiers: *Mountain snowpacks (Mont).

A study was made concerning the interrelationships existing between the seasonal mountain snowpack and climate and terrain. The field investigations were carried out in the mountains of southwestern Montana over four winter seasons. Most studies were conducted in the Bridger Mountain Range near Bozeman, Montana. The investigation included three main areas: (1) Snowpack accumulation as related to terrain and meteorological factors, (2) remote sensing of snow surface temperature by infrared radiometry, and (3) study of some of the physical properties of the seasonal mountain snowpack through snowpit sampling. An abstract and summary and conclusion of the investigation into each area are included. (See W72-11128 thru W72-11130) (Woodard-USGS)
W72-11127

SNOWPACK ACCUMULATION IN RELATION TO TERRAIN AND METEOROLOGICAL FACTORS IN SOUTHWESTERN MONTANA,
Montana State Univ., Bozeman.
J. T. McPartland, A. B. Super, and V. L. Mitchell.
In: The Mountain Snowpack as an Environmental Indicator; Montana State University Final Contract Report, p 2-8, September 1971. DAHC 04-C-0058.

Descriptors: *Snowpacks, *Mountains, Montana, *Meteorological data, Topography, Elevation, Slopes, Snow surveys, Depth, Snow cover, Water equivalent, Winds, Climates.
Identifiers: *Mountain snowpack accumulation.

The relationships between mountain snowpack accumulation and terrain and meteorological parameters were investigated in three separate mountain areas in southwestern Montana. Elevation, aspect, slope, geographic location and degree of potential windiness were used as terrain/meteorological parameters in the data analysis. Snowpack variables measured were snow depth and water equivalent. A very high simple linear correlation consistently existed between the snow depth and water equivalent. Statistical treatment of the data included simple correlation and multiple linear regression analyses, and principal component analysis. In the Bangtail area of the Bridger Range, elevation was the most important variable in explaining variance in snowpack depth. The potential windiness parameters were second in importance in explaining the depth variance. Aspect, slope, and location parameters were not effective in explaining the variance in snowpack depth. Variations in snowpack depth at the Carrot Basin area of the Madison Range and the Cooke City area of the Beartooth Range were explained by the elevation parameter. (See also W72-11127) (Woodard-USGS)
W72-11128

INFRARED TEMPERATURE SENSING OF SNOW-COVERED TERRAIN,
Montana State Univ., Bozeman.
B. A. Shafer, and A. B. Super.
In: The Mountain Snowpack as an Environmental Indicator; Montana State University Final Contract Report, p 9-12, September 1971. DAHCO4-67-C-0058.

Descriptors: *Snow cover, *Temperature, *Remote sensing, *Infrared radiation, *Thermal radiation, Snowpacks, Thermal properties, Thermometers, Analytical techniques, Aircraft, Cold regions.

The feasibility of remotely monitoring snow surface temperatures was investigated with a Barnes IT-3 infrared thermometer. The emissivity of various snow surface types was measured using an apparatus called an emissivity box. An average emissivity for freshly fallen snow was 0.975. The average emissivity for snow surfaces crusted by the effects of wind or melt phenomenon was 0.985. The mean emissivity for all snow surface types examined was 0.978. These high emissivity values substantiate the hypothesis that snow possesses characteristics in the 8 to 14 micron spectral interval. An analysis of errors in radiometrically obtained snow surface temperatures revealed that the IT-3 is capable of accurately measuring the true surface temperature to within 2 deg Celsius for the temperature range experienced. Inversions in snow covered mountain valleys were successfully mapped during airborne case studies. Tops of inversions were located by measuring the snow surface temperature variation with elevation and noting the intersection of the inversion top with the mountain slope. Remote radiometric temperature sensing of snow surfaces appears to offer a potentially useful tool for monitoring surface temperature gradients in arctic environments. (See also W72-11127) (Woodard-USGS)
W72-11129

PHYSICAL INVESTIGATIONS OF THE SEASONAL MOUNTAIN SNOWPACK: BRIDGER RANGE, MONTANA,
Montana State Univ., Bozeman.
A. B. Super, J. T. McPartland, and V. L. Mitchell.
In: The Mountain Snowpack as an Environmental Indicator, Montana State University Final Contract Report, p 13-15, September 1971. DAHCO4-67-C-0058.

Descriptors: *Snowpacks, *Physical properties, *Mountains, *Montana, Data collections, Analytical techniques, Depth, Density, Age, Temperature.
Identifiers: *Bridger Mountain Range (Mont), Grain size, Ram resistance, Shear vane strength, Air permeability.

Information on several mountain snowpack parameters was obtained from a number of snowpits dug in the Bridger Mountains of southwestern Montana. The data were collected during three winters from three separate sites. The primary parameters studied included depth, density, age, grain size, ram resistance, shear vane strength, temperature, and air permeability. Statistical analyses were made to determine how the snowpack parameters were related. Snow density was strongly related to the overburden pressure or load of the overlying snowpack and to the age of the snowpack. The relationship with age apparently resulted from the rate of loading, being approximately a linear function of time. Ram resistance was strongly related to density and shear vane strength. Air permeability correlated significantly with depth, age, grain size, and shear vane strength, but the individual relationships were relatively weak. (See also W72-11127) (Woodard-USGS)
W72-11130

JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 05B.
W72-11131

A SYSTEM TO COMBINE STRATIGRAPHIC AND ANNUAL MASS-BALANCE SYSTEMS: A CONTRIBUTION TO THE INTERNATIONAL HYDROLOGICAL DECADE,
Geological Survey, Fairbanks, Alaska.
L. R. Mayo, M. F. Meier, and W. V. Tangborn.
Journal of Glaciology, Vol 11, No 61, p 3-14, 1972. 4 fig, 2 tab, 5 ref.

Descriptors: *Glaciology, *Ice, *Mass, *Firn, *Meteorology, Meteorological data, Mathematical studies, Snow, Compaction, Density, Glaciers, Analytical techniques, Ablation, Summer, Surfaces, Stratification.
Identifiers: *Mass-balance systems.

Mass-balance quantities at specific points on a glacier relate either to annual maxima or minima in ice mass at that point (the stratigraphic system), or to values at the beginning and end of a hydrologic year (the annual or fixed-date system). Most quantities measured in the field relate to summer surfaces, which correspond to the annual minima at the measurement points. When stratigraphic system point values are integrated over a whole glacier, the result may be meaningless because annual maxima and minima and summer surfaces may form at different times at different places. The combined system utilizes several kinds of data to derive meaningful area-average results that can be directly related to other hydrologic and meteorologic information. Measurements to summer surfaces at certain specific times, including the beginning and end of a hydrologic year, are added together with proper recognition of the types of material involved: old firn and ice, snow and superimposed ice of the year under study, new firn formed during that year, and late snow deposited toward the end of the year. Other balance increment terms relate values at the beginning and end of a hydrologic year to corresponding area-average balance minima. As a result, two types of net balance and many other terms are given precise meaning for a glacier as a whole. (Woodard-USGS)
W72-11298

SNOWMELT CONTROL ON BELORUSSIAN ERODED LOAMY SOD PODZOLIC SOILS,
For primary bibliographic entry see Field 04D.
W72-11345

THE ROLE OF THE GROWTH OF PHYTOPLANKTON UNDER ICE IN PRODUCING ORGANIC MATTER IN LAKE BAIKAL,
For primary bibliographic entry see Field 05C.
W72-11409

GLACIER DAMMED LAKES AND OUTBURST FLOODS IN ALASKA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11445

WINTER CLIMATOLOGY AND ICE CHARACTERISTICS: ST. MARYS RIVER-WHITEFISH BAY WATERWAY,
United States Lake Survey, Detroit, Mich.
A. J. Brazel.
Available from NTIS, Springfield, Va 22151 as AD-733 958, $3.00 in paper copy, $0.95 in microfiche. National Oceanic and Atmospheric Agency Technical Memorandum NOS LSCR 3, September 1971. 29 p, 5 tab, 32 ref, 2 append.

Descriptors: *Iced lakes, *Ice cover, *De-icers, *Lake Superior, *Climatology, Rivers, Channels, Solar radiation, Winds, Air temperature, Data collections, Navigation.
Identifiers: *St. Marys River Waterway, *Whitefish Bay (Mich).

On a regional basis the thermal behavior of Lake Superior and its interaction with the atmosphere in late fall and early winter promote widely varying

temperature and snowfall patterns around the lake periphery. Snowaice layers make up a large portion of the total ice thickness around the lake and on the St. Marys River Waterway. Field observations of radiation, temperature, wind, ice thickness, and structure indicate a close relation between climatic parameters and ice growth and decay. De-icing schemes, particularly dusting with darkened materials, must account for climatic factors to be successfully implemented. There is a probability of successful de-icing on St. Marys River by correlating the dusting with solar radiation and air temperature data. (Woodard-USGS)
W72-11447

DAILY VARIATIONS IN SNOW DENSITY AS A POSSIBLE SOURCE OF ERROR IN CALCULATING WATER CONTENT OF SNOW IN MOUNTAINS (VNUTRISUTOCHNYYE IZMENENIYA PLOTNOSTI SNEGA KAK VOZMOZHNYY ISTOCHNIK OSHIBOK PRI RASCHETAKH SNEGOZA PASOV V GORAKH),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
G. Ye. Glazyrin.
In: Gornaya Gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 37-41, 1970. 1 fig, 6 ref.

Descriptors: *Orography, *Mountains, *Snow cover, *Snowpacks, *Density stratification, Snowmelt, Air temperature, Precipitation (Atmospheric), Variability.
Identifiers: USSR, *Uzbek SSR, *Snow density.

Daily variations in snow density at the 'Dukant' course in the Uzbek SSR in March 1968 and March-April 1969 were investigated as a possible source of error in determining water content of snow in mountains. Three causes are given for these variations: (1) addition of precipitation to snowpack; (2) irregular daily rates of snowmelt; and (3) compaction of snow under effect of gravity. Regardless of causes, the range of daily fluctuations of snow density generally decreases with increases in snow depth and water content. (See also W72-11450) (Josefson-USGS)
W72-11453

ELECTRICAL PROPERTIES OF ICE--ANNUAL REPORT FOR THE PERIOD NOVEMBER 1970 TO OCTOBER 1971,
New Mexico Inst. of Mining and Technology, Socorro.
G. W. Gross, and C. McKee.
Available from NTIS, Springfield, Va. 22151 as AD-738 193; Price $3.00 paper copy; $0.95 microfiche. New Mexico Institute of Mining and Technology Annual Contract Report, January 1972. 43 p, 10 fig, 2 tab, 24 ref, append. Project No. NR 082-094/9-29-70 (412), ONR-N 00014-67-A-0267-0005.

Descriptors: *Electrochemistry, *Freezing, *Ice-water interfaces, Laboratory tests, Ion exchange, Chemical reactions, Electrolytes, Clouds, Analytical techniques, Laboratory equipment.
Identifiers: Freezing potentials, Electrochemical charge separation, Ice-water solute partitioning.

Electrochemical charge separation in freezing water (Workman-Reynolds effect) is modified in the presence of multiple solute species. This interference may either increase or decrease the charge separation. One important type of interference alters the solution pH. Depending on the type of solute, a moderate increase of pH above 7 or a moderate decrease below 7 may result in maximum charge separation effects, and conversely, in their suppression. Another type of interference causes a reversal of the freezing-potential sign as a function of concentration (of the interfering species) or of concentration and time. This effect probably operates through the solute partition coefficients. The most important interference effects studied thus far involve ammonia, carbon dioxide, and possible silica. Interference effects cannot always be separated from concentration effects. Certain interference processes broaden the concentration range in which appreciable charge separation may occur for a given solute. (Woodard-USGS)
W72-11471

POSTGLACIAL LAHARS FROM MOUNT RAINIER VOLCANO, WASHINGTON,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02J.
W72-11473

SNOW COVER AT THE TIMBERLINE AND ITS EFFECT ON TREE VEGETATION,
S. G. Shiyatov.
Tr Inst Ekol Rast Zhivotn Ural Fil Akad Nauk SSSR. 69. 141-157. 1969.
Identifiers: Density, Forests, *Larch-G, Plants, Siberia, *Snow cover, Thaw, *Timberline, Trees, USSR, Vegetation.

Investigations were conducted on the eastern slope of the Polar Urals (the Sob' River basin). A profile of 820 x 20 m was established and mapped through the timberline formed by Siberian larch. In addition, 30 sample plots were also established. The following were studied: thickness of the snow cover, its structure, snow density, snow thaw rate, etc., in relation to topography and vegetation, and the effect of snow cover on vegetation (injuries to plants, their phenological development). The insular nature of larch open forest is due to the fact that on the open plots, snow cover attains a thickness of 4-5 m or more and thaws slowly. Minimum thickness of snow cover for larch in the open forest on the timberline is 40-50 cm, optimal is 1-2 m. Old trees and undergrowth at an age of 20-30 yr can grow on plots with a thick snow cover, since the trees start growing before the snow has melted, while for the undergrowth a short growing season is sufficient. Larch at the age of 30-80 years suffers particularly on plots with a thick snow cover. Forest belts in the forest tundra should be wind-pervious and oriented against the dominant winds. In order to help regeneration, snow retention is recommended for 5-10 yr. By regulating the thickness of the snow cover the terminal shoots of the undergrowth may be protected from snow corrosion in snowstorms.--Copyright 1972, Biological Abstracts, Inc.
W72-11639

THE MEASUREMENT OF CONDUCTIVITY AND TEMPERATURE IN THE SEA FOR SALINITY DETERMINATION,
Department of the Environment, Victoria (British Columbia). Frozen Sea Research Group.
For primary bibliographic entry see Field 07B.
W72-11669

THE MEASUREMENT OF SNOW DEPTH AND DENSITY USING A SHORT PULSE RADAR SYSTEM,
Colorado State Univ., Fort Collins. Dept. of Electrical Engineering.
R. S. Vickers.
Available from NTIS, Springfield, Va 22151 as PB-206 685, Price: $3.00 paper copy; 95 cents microfiche. Report REC-14-06-D-7159-1, December 1971. 30 p, 12 fig, 2 tab, 10 ref.

Descriptors: *Remote sensing, *Snowpacks, *Radar, *Snow surveys, Density stratification, Water equivalent, Snow cover, Water yield, Electromagnetic waves, Instrumentation.

Progress in the measurement of the thickness and water content of snow and ice layers from a remote location is reviewed. Several radar techniques have been applied to the problem with varying degrees of success. A short pulse radar system is described. It measures the thickness and water equivalent of snow and ice layers. Representative data from field tests of the system are included. Snow density and thickness can be measured to better than 10% accuracy. The limitations and future potential of the system in an airborne application are discussed. Discontinuities in density can be detected and their location can be determined by inspection of the radar returns. The potential of the radar to evolve into an airborne, operational system is considered good, even with the constraint of using standard commercial components. (Knapp-USGS)
W72-11671

2D. Evaporation and Transpiration

EFFECT OF GROUNDWATER TABLES ON THE WATER--SALT REGIME OF SOILS AND THEIR EVAPORATION CAPACITY IN THE VOLGA-AKHTUBA FLOODPLAIN,
For primary bibliographic entry see Field 03C.
W72-11346

BOUNDARY LAYER RESISTANCE AND TEMPERATURE DISTRIBUTION ON STILL AND FLAPPING LEAVES: I. THEORY AND LABORATORY EXPERIMENTS,
Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
J. Y. Parlange, P. E. Waggoner, and G. H. Heichel.
Plant Physiol. Vol 48, No 4, p 437-442. 1971. Illus.
Identifiers: Boundary layers, Distribution, Flapping, Laboratory, *Leaves, *Resistance, Still, *Temperature, Theory, Velocity, Wind.

If the evaporation is uniform on a flat exposed leaf, forced convection will also be nearly uniform, and the leaf temperature will vary with the square root of the distance from the leading edge. Then the resistance expressed in terms of the proper, i.e., average, temperature has the same value as the resistance of a leaf at uniform temperature. Compared to a steady laminar flow, the turbulence of a realistic wind decreases the resistance by a constant factor of about 2.5. The same constant factor was observed whether the leaf was flapping or not, when the wind velocity was not too low.--Copyright 1972, Biological Abstracts, Inc.
W72-11435

THE EFFECT OF DIFFERENT MINERAL FERTILIZER PROPORTIONS ON THE WATER REGIME OF SOME TREE SPECIES,
N. H. Babajev.
Tr Azerb Nauchno-Issled Inst Lesn Khoz Agrolesomelior. Vol 8, p 94-105. 1968.
Identifiers: *Fertilizers, Fraxinus-pennsylvanica D, Dry matter, Minerals, Photosynthesis, Pinus eldarica G, Proportions, Robinia pseudacacia D, Species, Transpiration, Trees, *Water balance.

With the application of N90P90 in Robinia pseudacacia and of N120P60/ha in Fraxinus pennsylvanica and Pinus eldarica stands, the daily and seasonal transpiration increased. Application of various doses and proportions of NPK positively influenced the accumulation of water in leaves, intensified the mechanism of stomatal behavior, the course of photosynthesis and the accumulation of dry matter.--Copyright 1972, Biological Abstracts, Inc.
W72-11436

TOTAL EVAPORATION DURING LEACHING OF SALINE SOIL (SUMMARNOYE ISPARENIYE PRI PROMYVKAKH ZASOLENNYKH ZEMEL'),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
S. I. Vanichkina.

In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 53-62, 1970. 2 fig, 2 tab, 12 ref.

Descriptors: *Evaporation, *Measurement, *Leaching, *Drainage, *Saline soils, Salinity, Water loss, Water balance, Heat balance, Heat transfer, Radiation, Border irrigation, Groundwater, Evaporation pans, Equations.
Identifiers: USSR, *Tadzhikistan, *Solonchaks, Soil monoliths.

The effectiveness of horizontal drainage during leaching of saline soil was investigated in 1964-66 by the Moscow Water Reclamation Institute on a water-balance plot in the Kanibadam Rayon of Tadzhikistan. Soils of the region are Meadow-Sierozem Solonchaks with a chloride-sulfate salinity. To measure evaporation from the surface during leaching, heat-transfer equations and GGI-500-50 evaporation pans designed by the Leningrad State Hydrologic Institute were used. An empirical equation was developed to estimate evaporation from leached saline soil after removal of water from fields, using the radiation budget expressed in cal/day/sq cm as a parameter. (See also W72-11450) (Josefson-USGS)
W72-11455

DETERMINATION OF EVAPORATION FROM FREE-WATER SURFACES DURING LEACHING OF SALINE SOIL (RASCHET ISPARENIYA S VODNOY POVERKHNOSTI PRI PROMYVKAKH ZASOLENNYKH ZEMEL'),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
S. I. Vanichkina.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 63-70, 1970. 3 tab, 3 ref.

Descriptors: *Evaporation, *Measurement, *Leaching, *Saline soils, Heat balance, Heat transfer, Radiation, Albedo, Water loss, Water temperature, Border irrigation, Seasonal, Winter, Summer.
Identifiers: USSR, *Tadzhikistan, Heat exchange.

Observations of evaporation from free-water surfaces during leaching of strongly saline, fine-textured soil at a water-balance plot in the Kanibadam Rayon of Tadzhikistan in June-November 1964, June 1965, and March-April 1968 were compared with data obtained under standard conditions at a site 70 km to the west. In winter, evaporation at the border and at the site was practically the same and amounted to 30-35 mm/month in December-January and 37-38 mm/month in February. In summer, evaporation measurements under leaching conditions were excessive. Conversion factors based on heat balances were computed for relating evaporation at the site to that at the border. Application of conversion factors to evaporation values obtained under standard conditions is the most convenient method of obtaining evaporation data at flooded plots. (See also W72-11450) (Josefson-USGS)
W72-11456

ACCURACY OF MEASURING EVAPORATION FROM SOIL SURFACES USING SMALL EVAPORATION PANS (O TOCHNOSTI NABLYUDENIY ZA ISPARENIYEM S POVERKHNOSTI POCHVY PO MIKROISPARITELYAM),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
Yu. N. Ivanov.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 71-76, 1970. 2 fig, 1 tab, 3 ref.

Descriptors: *Evaporation, *Evapotranspiration, *Evaporation pans, *Measurement, Analysis, Diurnal, Drying, Cotton, Probability.
Identifiers: USSR, *Uzbek SSR, Tashkent Oblast, Soil monoliths.

Investigations were conducted in a cotton field in the Yangiyul' Rayon of Tashkent Oblast (Uzbek SSR) in June-August 1968 to determine the accuracy of pan measurements of evaporation from soil surfaces during daylight hours. Area of the evaporating surface of the pan is 50 sq cm; pan depth is 10 cm; and volume of the soil block in the pan is 500 cu cm. The average difference in daytime evaporation values for the different pans is 12.7%. To measure daytime changes in evaporation from soils, the soilblock can be replaced twice a day. Daytime evaporation results obtained from installation of 3 to 4 of these pans are within plus or minus 10% of the true values. Replaceable soil-block equipment gives results 1-2% higher than pans containing undisturbed soil samples. (See also W72-11450) (Josefson-USGS)
W72-11457

PHOTOSYNTHESIS--POLICIES AND PROGRAMS FOR GREAT POTENTIALS, BEGINNING STAGES FOR EFFECTIVE WATER MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11594

WATER CONSUMPTION BY PLANTS,
Universidad Nacional de Colombia, Palmira. Facultad de Agronomia.
M. Crillo-F.
Acta Agron (Palmira). Vol 21, No 2, p 87-91. 1971.
Identifiers: *Consumptive use, Energy balance, Plants, Soils, Solar, *Transpiration, *Evapotranspiration.

Water consumption by plants (transpiration-evapotranspiration) is primarily controlled by solar energy, but modified by the plant, soil and atmospheric factors that control the absorption and distribution of energy at the evaporating surface (leaves, soil surface, etc.). Plants' moisture content makes up only a small portion (1%) of the total water consumed or used (transpired water). To convert 1 cm3 of liquid water to vapor at environmental temperature and 1 atm pressure takes about 585 cals. The sun supplies about 99.97% of the heat energy required for the physical processes in the earth-atmosphere system. The balance of energy is discussed.--Copyright 1972, Biological Abstracts, Inc.
W72-11689

DETERMINATION OF TIME FOR IRRIGATING CORN ON THE BASIS OF DAILY CALCULATION OF WATER CONSUMPTION DUE TO EVAPO-TRANSPIRATION,
Novi Sad Univ. (Yugoslavia). Faculty of Agriculture.
N. Vucic, and B. Jocic.
Arh Poljoprivr Nauke. Vol 23, No 80, p 56-65. 1970. Illus. English summary.
Identifiers: Calculations, Consumption, Daily, Determination, *Irrigation, Time, *Evapotranspiration, *Rates of application.

Daily calculation of water consumption due to evapo-transpiration was used as a basis for determining irrigation regime. The method is applicable where there is little deviation in the time of irrigation.--Copyright 1972, Biological Abstracts, Inc.
W72-11690

THE EFFECTS OF COPPER IONS ON TRANSPIRATION,
Eotvos Lorant Univ., Budapest (Hungary). Chair of Plant Physiology.
T. D. Ninh.
Bot Kozl. Vol 58, No 2, p 99-102. 1971. Illus.
Identifiers: *Copper ions, Glycine-Soja-D, Ions, Sulfates, *Transpiration, *Zea-Mays-M.

Seeds of Glycine soja and Zea mays were soaked in a 0.005% CuSO4 solution. Transpiration in the young plants from these seeds was lower than young plants from seeds soaked in water.--Copyright 1972, Biological Abstracts, Inc.
W72-11691

2E. Streamflow and Runoff

FLOODS ON THE GUYANDOTTE RIVER IN THE VICINITY OF LOGAN, LOGAN COUNTY, WEST VIRGINIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11278

WATER RESOURCES DATA FOR KANSAS, 1971: PART I. SURFACE WATER RECORDS.
Geological Survey, Lawrence, Kans.

Geological Survey Data Report, 1972. 206 p, 2 fig, 3 ref.

Descriptors: *Surface waters, *Streamflow, *Gaging stations, *Flow rates, *Kansas, Average flow, Low flow, Peak discharge, Lakes, Reservoirs, Water levels, Crest-stage gages, Hydrologic data, *Basic data collections.

Surface-water records are presented for the 1971 water year for Kansas, including records of streamflow or reservoir storage at gaging stations and partial-record stations. Records for a few pertinent gaging stations in bordering States also are included. The data reported comprise a description of the gaging station, and tables showing the daily, monthly, and yearly discharges of the stream. The description of the station gives the location, drainage area, records available, type and history of gage, average discharge, extremes of discharge, and general remarks. For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. Data for partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow, partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. (Woodard-USGS)
W72-11282

WATER RESOURCES AND GEOLOGY OF WINSTON COUNTY, ALABAMA,
Geological Survey, University, Ala.
K. D. Wahl, W. F. Harris, and P. O. Jefferson.
Alabama Geological Survey Bulletin 97, 1971. 51 p, 10 fig, 6 plate, 7 tab, 23 ref.

Descriptors: *Water resources development, *Groundwater, *Surface waters, *Hydrogeology, *Alabama, Water yield, Water quality, Hydrologic data, Basic data collections, Water wells, Aquifer characteristics, Streamflow, Flow rates, Lakes, Water analysis, Chemical analysis.
Identifiers: *Winston County (Ala).

Water resources data for Winston County, Alabama, show quantity and quality of surface and groundwaters as related to the geology and water use. The Bangor Limestone and the Pottsville Formation are the two major sources of groundwater. The Bangor Limestone consists of about 400 to 550 feet of limestone and shale. Water-bearing openings occur primarily in the upper 25 to 50 feet, which is a potential source of 25 to 50 gpm. Water from the Bangor generally is moderately hard to hard and low in iron content. The Pottsville Formation consists of 1,200 feet of sandstone, shale, and coal. Individual wells produce from less than 5 to about 375 gpm. The water ranges from soft to hard and is of good chemical quality except in places where the iron

content may be objectionable. Most of the streams draining Winston County originate within the county. The average flow into Lewis Smith Lake is approximately 670 mgd. Sipsey Fork, the largest stream, had a maximum recorded flow of 48,400 cfs near Falls City. The total use of water in Winston County during a peak demand period was about 1.2 mgd in 1965. Groundwater sources supply about 75% of the water and surface water sources about 25%. (Woodard-USGS)
W72-11283

TEMPERATURE OF FLORIDA STREAMS,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 07C.
W72-11284

SUMMARY OF PLANS FOR ACQUISITION OF SURFACE-WATER DATA BY FEDERAL AGENCIES, FISCAL YEAR 1973: STAGE, STREAMFLOW AND QUALITY.
Geological Survey, Washington, D.C. Office of Water Data Coordination.
For primary bibliographic entry see Field 07A.
W72-11287

SOME THOUGHTS ON ESTIMATING SPILLWAY DESIGN FLOOD,
Resources Research Centre, Ottawa (Ontario).
For primary bibliographic entry see Field 02A.
W72-11295

CONTROL OF THE DAILY WATER LEVEL DATA--TEST BY RELATING REDUCED LEVELS (CONTROLE DES COTES HYDROMETRIQUES JOURNALIERES--TEST DU RAPPORT DES COTES REDUITES),
Institut Royal Meteorologique de Belgique (Brussels). Hydrology Section.
For primary bibliographic entry see Field 02A.
W72-11296

AUTOMATIC DETECTION OF WATER-BORNE FLUORESCENT TRACERS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 07B.
W72-11297

WATER RESOURCES INVESTIGATIONS IN PENNSYLVANIA, 1969.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11305

WATER RESOURCES INVESTIGATIONS IN MAINE, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11306

WATER RESOURCES INVESTIGATIONS IN TENNESSEE, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11307

A GEOGRAPHIC ANALYSIS OF HYDROLOGIC RESPONSE IN THE SOUTHEASTERN UNITED STATES,
Franklin Coll. of Arts and Sciences, Athens, Ga. School of Forest Resources.
For primary bibliographic entry see Field 02A.
W72-11312

CONTRIBUTIONS TO THE THEORY OF WATER WAVES ON A SLOPING BEACH,
Wisconsin Univ., Madison. Dept. of Mathematics.
M. A. Gwaiz.
Ph.D. thesis, 1972. 158 p, 20 fig, 38 ref. OWRR A-037-WIS (5).

Descriptors: *Laplaces equation, *Mathematical studies, *Flow, *Energy, *Waves (Water), *Ocean waves, Fourier analysis, *Frequency.
Identifiers: *Sloping beach, *Velocity potential.

In the linear theory, the motion of an inviscid, incompressible and irrotational fluid of constant density on a uniformly sloping beach may be posed as a boundary-value problem for the Laplace equation. Two types of solutions are considered: those which are bounded at the shore (reflected waves), and those which have a logarithmic singularity. The latter type is supposed to represent ocean waves which 'break' along the shoreline. In part I the uniqueness of two-dimensional waves under the influence of an external pressure disturbance is investigated. Uniqueness is guaranteed if and only if the coefficient of the logarithmic singularity at the shore is prescribed, in particular if the solution is bounded there. The bounded solution generated by an oscillatory impulse is constructed and its steady-state limit is shown to coincide with the solution of the corresponding time-harmonic problem. In part II time-harmonic, three dimensional waves whose dependence on the third dimension is sinusoidal are discussed. Over a certain range, the frequency of oscillation determines the behavior of the waves at the shore: for certain discrete values of the frequency, bounded waves are obtained, while singular waves exist over the rest of the frequency spectrum. The two types of waves do not coexist.
W72-11389

MOUNTAIN HYDROLOGY (GORNAYA GIDROLOGIYA).
Sredneaziatskii Nauchno-Issledovatel skii Gidrometeorologicheskii Institut, Tashkent (USSR).

Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), Yu. N., Ivanov, and P. M. Mashukov, editors, 1970. 124 p.

Descriptors: *Hydrology, *Hydrologic aspects, *Orography, *Mountains, Rainfall-runoff relationships, Stage-discharge relations, Discharge measurement, Gages, Channels, Streamflow forecasting, Flood routing, Overland flow, Sediment discharge, Water balance, Heat balance, Evaporation, Watersheds (Basins), Lakes, Analytical techniques, Hypsometric analysis.
Identifiers: USSR, *Soviet Central Asia, Amu-Dar'ya River, Syr-Dar'ya River, Hydrometric stations, Firn line, Snow line, Snow density, Solonchaks, Soil monoliths.

This collection contains 13 papers dealing with formation and calculation of mountain streamflow, sediment discharge in rivers, and techniques for calculating precipitation, snow cover, and evaporation in Soviet Central Asia. Specific topics include: (1) average annual runoff in the Fergana basin; (2) maximum melt-water discharges of ungaged mountain rivers in upper Amu-Dar'ya reaches; (3) daily variations in snow density as a possible source of error in computing water content of snow in mountains; (4) precipitation in the Chirchik-Keles interfluve; (5) evaporation from free-water surfaces during leaching of saline soil; (6) evaporation from soil surfaces using small evaporation pans; (7) water-discharge measurements in the Amu-Dar'ya River; (8) use of flood-routing techniques to forecast runoff in regulated reaches of the Syr-Dar'ya River; (9) overland flow from mountains of Soviet Central Asia; and (10) new data on lakes of Soviet Central Asia. (See also W72-11451 thru W72-11459) (Josefson-USGS)
W72-11450

DISTRIBUTION OF AVERAGE ANNUAL RUNOFF IN THE FERGANA BASIN (RASPREDELENIYE SREDNEGO GODOVOGO STOKA V PREDELAKH FERGANSKOY KOTLOVINY),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
O. P. Shcheglova, and V. Ye. Chub.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy. No 54 (69), p 3-17, 1970. 3 fig, 4 tab, 13 ref.

Descriptors: *Runoff, *Average runoff, *Mountains, *Orography, *Hypsometric analysis, Elevation, Height, Watersheds (Basins), Glaciers, Firn, Snowmelt, Floods, Precipitation (Atmospheric), Rainfall-runoff relationships, Maps.
Identifiers: USSR, *Uzbek SSR, *Fergana, Snow line, Firn line, Firn limit, Glacier tongues, Hydrometric stations.

Hypsometric relations of zonal runoff in the Fergana basin in east Uzbek SSR were investigated for preparing a map of average annual streamflow. Zonal runoff values in individual basins range from 200-300 mm in lower zones to 2,000 mm or more in high mountain areas. The highest point of zonal runoff is about 4,100 m and coincides approximately with the height of the firn line on glaciers. Runoff values at lower elevations along the eastern ridge of the northern slope of the Alay mountain rangl are the same as those in the western part. Calculated runoff values agree with the precipitation recorded at different elevations. (See also W72-11450) (Josefson-USGS)
W72-11451

CALCULATION OF MAXIMUM MELT-WATER DISCHARGES OF UNGAGED MOUNTAIN RIVERS IN UPPER AMU-DAR'YA REACHES (RASCHET MAKSIMAL'NYKH RASKHODOV TALOGO STOKA NEIZUCHENNYKH GORNYKH REK VERKHOV'YEV AMUDAR'I),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
B. K. Sheremet, and A. I. Khon.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 18-29, 1970. 4 tab, 8 ref.

Descriptors: *Melt water, *Discharge (Water), *Discharge measurement, *Rivers, *Mountains, Orography, Elevation, Hypsometric analysis, Watersheds (Basins), Drainage area, Gaging stations, Runoff, Floods, Snowmelt, Water yield, Air temperature, Equations, Probability.
Identifiers: USSR, *Tadzhikistan, *Pamirs, Snow line, Firn line.

Analysis of maximum water discharges of mountain rivers was based on runoff observations at 23 gaging stations in upper reaches of the Amu-Dar'ya River in Soviet Central Asia. Maximum discharges of purely melt-water origin are formed in basins whose areal extent above an elevation of 3 km is at least one-third the entire basin area. Using basin area and height of snow line as parameters, semiempirical equations are developed to calculate average long-term maximum melt-water discharges for central and southern Tadzhikistan and the western Pamirs. When height of snow line is 4.9 km, the error of discharge measurement is not more than plus or minus 25%. (See also W72-11450) (Josefson-USGS)
W72-11452

DAILY VARIATIONS IN SNOW DENSITY AS A POSSIBLE SOURCE OF ERROR IN CALCULATING WATER CONTENT OF SNOW IN MOUNTAINS (VNUTRISUTOCHNYYE IZMENENIYA PLOTNOSTI SNEGA KAK VOZMOZHNYY ISTOCHNIK OSHIBOK PRI RASCHETAKH SNEGOZA PASOV V GORAKH),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02C.
W72-11453

MEASUREMENT OF PRECIPITATION IN THE CHIRCHIK-KELES INTERFLUVE (K VOPROSU O VYCHISLENII OSADKOV V CHIRCHIK-KELESSKOM MEZHDURECH'YE),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02B.
W72-11454

TOTAL EVAPORATION DURING LEACHING OF SALINE SOIL (SUMMARNOYE ISPARENIYE PRI PROMYVKAKH ZASOLENNYKH ZEMEL'),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02D.
W72-11455

DETERMINATION OF EVAPORATION FROM FREE-WATER SURFACES DURING LEACHING OF SALINE SOIL (RASCHET ISPARENIYA S VODNOY POVERKHNOSTI PRI PROMYVKAKH ZASOLENNYKH ZEMEL'),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02D.
W72-11456

ACCURACY OF MEASURING EVAPORATION FROM SOIL SURFACES USING SMALL EVAPORATION PANS (O TOCHNOSTI NABLYUDENIY ZA ISPARENIYEM S POVERKHNOSTI POCHVY PO MIKROISPARITELYAM),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02D.
W72-11457

ACCURACY OF WATER-DISCHARGE MEASUREMENTS IN THE AMU-DAR'YA RIVER (O TOCHNOSTI OPREDELENIYA RASKHODOV VODY V R. AMUDAR'YE),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
P. M. Mashukov.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 77-86, 1970. 1 fig, 3 tab, 1 ref.

Descriptors: *Discharge (Water), *Stage-discharge relations, *Discharge measurement, Gages, Gaging stations, Water levels, Runoff, Streamflow, Channels, Channel morphology, Width, Depth, Seasonal.
Identifiers: USSR, *Soviet Central Asia, *Amu-Dar'ya River, Hydrometric stations.

The Amu-Dar'ya River in Soviet Central Asia is characterized by extensive and rapid channel alterations which affect the accuracy of discharge measurements. On the basis of hydrometric work by the hydrologic expedition of the All-Union Experimental Design and Planning Scientific Research Institute (Gidroproyekt) in 1951, measurements of discharges in the vicinity of Lavak village were compared with those at the Chatly station 18 km downstream. The water-level record at the Chatly station and discharge measurements at the two sites were used to calculate runoff. Water discharges for ten-day periods computed at Lavak in March-May were 16% lower and during the remainder of the year 17% higher than those at Chatly station. To obtain a more reliable water-level record, several staff gages should be installed along the stream to compute the correct discharge. (See also W72-11450) (Josefson-USGS)
W72-11458

NEW DATA ON LAKES IN SOVIET CENTRAL ASIA (NOVYYE SVEDENIYA OB OZERAKH SREDNEY AZII),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02H.
W72-11459

ANALYSIS OF POTENTIAL ERRORS IN REAL--TIME STREAMFLOW DATA AND METHODS OF DATA VERIFICATION BY DIGITAL COMPUTER,
Geological Survey, Portland, Oreg.
D. J. Lystrom.
Geological Survey Open-file Report, May 1972. 41 p, 13 fig, 1 tab, 8 ref.

Descriptors: *Streamflow, *Hydrologic data, *Data collections, *Remote sensing, *Analytical techniques, Correlation analysis, Data processing, Digital computers, Reliability, Methodology.
Identifiers: *Real-time data, Data collection methods, Comparison.

The magnitude, frequency, and types of errors inherent in real-time streamflow data are presented. Real-time data are generally less accurate than historical data, primarily because real-time data are often used before errors can be detected and corrections applied. Various methods of verifying real-time streamflow data are outlined. Relatively large errors (those greater than 20-30 percent) can be detected readily by use of well-designed verification programs for a digital computer. Smaller errors can be detected only by discharge measurements and field observations. The capability to substitute a simulated discharge value for missing or erroneous data is incorporated in some of the verification routines. The routines represent concepts ranging from basic statistical comparisons to complex watershed modeling and provide a selection from which real-time data users can choose a suitable level of verification. (Woodard-USGS)
W72-11460

A PRELIMINARY ANALYSIS OF LOW FLOWS AT SELECTED SITES IN THE SOUTHERN PART OF THE TOWN OF BETHLEHEM, NEW YORK,
Geological Survey, Albany, N.Y.
O. P. Hunt, and R. M. Beall.
New York Water Resources Commission Report of Investigation R I-1, 1968, 10 p, 2 fig, 1 tab, 3 ref.

Descriptors: *Streamflow, *Low flow, *Base flow, Hydrologic data, *New York, Basic data collections, Flow rates, Stream gages, Precipitation (Atmospheric), Geology, Topography.
Identifiers: *Bethlehem (NY).

Low-flow characteristics are described for the following stream sites in and near the town of Bethlehem, N. Y.: Vloman Kill at Jericho Road at Mallorys Corners; Vloman Kill at Highway 144 at Cedar Hill; South Albany Creek near mouth, near South Bethlehem; Coeymans Creek at Highway 396, near South Bethlehem; and Coeymans Creek near Interstate Route 87, near Coeymans. In addition, results of discharge measurements made at 18 sites in the Vloman Kill and Coeymans Creek basins since 1952 are listed. The study includes an area of about 75 square miles, of which about 30 square miles are in the Vloman Kill basin and about 45 square miles are in the Coeymans Creek basin. Both basins are directly tributary to the Hudson River estuary. U. S. Weather Bureau precipitation records for the city of Albany illustrate the annual variability of the source of supply. Also shown are the extremes and average of annual precipitation for the 141-year period, 1826-1966. Most of the streamflow data were collected during the period of recovery from the severe drought of 1962-65. (Woodard-USGS)
W72-11461

HYDROLOGIC CONDITIONS DURING 1970 IN DADE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. E. Hull.
Geological Survey Open-file Report, 1972. 80 p, 38 fig, 4 tab, 5 ref.

Descriptors: *Hydrologic data, *Basic data collections, *Surface waters, *Groundwater, *Florida, Rainfall, Runoff, Streamflow, Flow rates, Stream gages, Water table, Water levels, Water wells, Water level fluctuations, Water utilization, Pumping, Withdrawal, Water yield, Groundwater recharge, Aquifer characteristics, Hydrographs.
Identifiers: *Dade County (Fla).

Hydrologic data collected during the 1970 water year in Dade County, Florida, show that rainfall was 25 inches below the 30-year average; groundwater levels were about average; and the yearly lowest groundwater levels were 2 ft above the average lowest in the western part of the county and about average in the northern and southern parts. The combined average daily discharge from six major streams and canals that flow into Biscayne Bay was 1,755 cfs, only 75 cfs less than during the 1969 water year. The range in discharge for 1970 was less than that for 1959-65, and during low-flow periods the discharge was greater in 1970 than in 1959-65. During 1969 and 1970 the salt front remained stationary. The major advances of the salt front occurred prior to 1946, at which time salt barriers in all major canals were constructed. From 1946 to 1969 the salt front retreated seaward. (Woodard-USGS)
W72-11469

HYDROLOGIC STUDIES OF LITTLE POND CREEK AND NORTH ELM CREEK WATERSHEDS, BRAZOS RIVER BASIN, TEXAS, 1963-69,
Geological Survey, Austin, Tex. Water Resources Div.
R. O. Hawkinson.
Geological Survey Data Report, January 1972. 137 p, 3 fig, 8 tab, 13 ref, append.

Descriptors: *Rainfall-runoff relationships, *Small watersheds, *Texas, *Basic data collections, *Hydrologic data, Streamflow, Storms, Storm runoff, Peak discharge, Flow rates, Hydrographs, Mass curves, Regression analysis, Reviews, Watershed management.
Identifiers: *Brazos River Basin (Tex), Little Pond Creek (Tex), North Elm Creek (Tex).

The drainage areas of Little Pond Creek and North Elm Creek (Brazos River Basin), within the study area near Waco, Texas, are 22.2 and 48.6 square miles, respectively. The watersheds are adjoining and are about 40 miles south of Waco. Average annual rainfall for this area is 33.85 inches. During the period 1962-69, average annual rainfall on the Little Pond Creek watershed was 31.73 inches compared to 31.74 inches on the North Elm Creek watershed. Average annual runoff for this same period was 7.28 inches on the Little Pond Creek watershed and 6.12 inches on the North Elm Creek watershed. The peak discharges on North Elm Creek, in cubic feet per second per square mile, were significantly less than those occurring on Little Pond Creek at the 1-percent level. Runoff from the two watersheds, expressed as a percentage of annual rainfall, was not significantly different at the 1-percent level. No significant difference at the 1-percent level was detected in runoff expressed as a percentage of total rainfall from 40 concurrent storm events on the two watersheds. Multiple regression analyses were used to develop peak-flow predictions equations for each watershed. The standard error of estimate of the prediction equation for Little Pond Creek is 69 percent, and for North Elm Creek 30 percent. (Woodard-USGS)
W72-11470

WATER RESOURCES INVESTIGATIONS IN NEVADA, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11653

WATER RESOURCES INVESTIGATIONS IN NEW HAMPSHIRE, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11654

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE AUSTIN, TEXAS METROPOLITAN AREA, 1970,
Geological Survey, Austin, Tex. Water Resources Div.
J. K. VanZandt.
Geological Survey Open-file Report (Texas District), January 1972. 70 p, 3 fig, 1 tab, append.

Descriptors: *Rainfall-runoff relationships, *Streamflow, *Urban hydrology, *Basic data collections, *Texas, Hydrologic data, Storms, Hydrographs, Mass curves, Stream gages, Gaging stations, Flow rates, Rain gages, Watershed management, Small watersheds, Urban runoff, Storm runoff.
Identifiers: *Austin (Tex).

Rainfall and runoff data are presented for Waller Creek (Austin, Tex area) for the 1970 water year. The Waller Creek drainage area lies entirely within the city of Austin, with the headwaters originating in the northern part of the city. The creek flows south for 6.6 miles to the Colorado River. Storm sewers and Street gutters divert runoff both into and out of the natural drainage area. The headwaters of Wilbarger Creek originate in Travis County near the Williamson County line and flow southeasterly about 40 miles to the Colorado River. The Wilbarger Creek study area is about 15 miles north of the city of Austin. The weighted-mean rainfall upstream from 38th Street was 35.82 inches, 10% above the mean annual rainfall for Austin of 32.58 inches. Mean daily discharge was 1.65 cfs; annual runoff was 9.68 inches, or 27% of rainfall. The weighted-mean rainfall upstream from 23rd Street was 34.95 inches, 7% above the mean annual rainfall for Austin. Mean daily discharge was 3.24 cfs; annual runoff was 10.66 inches, or 30% of rainfall. Rainfall-runoff data for 4 storms are summarized. (Woodard-USGS)
W72-11661

TECHNIQUES FOR ASSESSING WATER RESOURCE POTENTIALS IN THE DEVELOPING COUNTRIES WITH EMPHASIS ON STREAMFLOW, EROSION AND SEDIMENT TRANSPORT, WATER MOVEMENT IN UNSATURATED SOILS, GROUND WATER, AND REMOTE SENSING IN HY DROLOGIC APPLICATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11672

WATER RESOURCES INVESTIGATIONS IN NORTH DAKOTA, 1969.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11675

2F. Groundwater

CHANGES IN NITROGEN REGIME OF PEAT SOIL AS A FUNCTION OF GROUNDWATER DEPTH (IZMENENIYE AZOTNOGO REZHIMA TORFYANOY POCHVY V ZAVISIMOSTI OT UROVNYA GRUNTOVYKH VOD),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11124

ANALOG SIMULATION OF WATER-LEVEL DECLINES IN THE SPARTA SAND, MISSISSIPPI EMBAYMENT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11279

WATER RESOURCES AND GEOLOGY OF WINSTON COUNTY, ALABAMA,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 02E.
W72-11283

RECORDS OF PRECIPITATION, WATER LEVELS, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1971.
Geological Survey, San Antonio, Tex.
For primary bibliographic entry see Field 07C.
W72-11288

WATER WELL AND GROUND-WATER CHEMICAL ANALYSIS DATA, SUTTON COUNTY, TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 04B.
W72-11290

HYDRODYNAMICS IN DEEP AQUIFERS OF THE ILLINOIS BASIN,
Illinois State Geological Survey, Urbana.
D. C. Bond.
Illinois Geological Survey Circular 470, 1972. 72 p, 22 fig, 7 tab, 34 ref, 2 append.

Descriptors: *Groundwater movement, *Deep percolation, *Hydrodynamics, *Aquifer characteristics, *Illinois, Deep wells, Water levels, Pressure, Density, Brines, Pressure head, Stratified flow, Pressure head, Injection wells, Underground waste disposal, Oil-water interfaces.
Identifiers: *Illinois Basin.

Data on water levels, pressures, and water densities in deep aquifers in and around the Illinois Basin are presented. Brines in the deep aquifers of the Illinois Basin are highly stratified. Over a distance of about 120 miles, along a line from West Chicago to Tuscola, the density of the interstitial water in the Mt. Simon aquifer is approximately a linear function of depth. To the west of this line the density is less, while to the east the density is greater, for a given elevation. In the northern third of Illinois, water flows through the Mt. Simon Aquifer from the west to the east. Some net head exists (about 100 to 200 feet) to cause vertical flow from the Mt. Simon Aquifer to shallower aquifers. Effects of variations in water density in problems related to gas storage, oil accumulation, origin of brines, and underground waste disposal include, for example, a tilted oil-water interface maintained with zero flow. (Woodard-USGS)
W72-11291

WATER RESOURCES INVESTIGATIONS IN PENNSYLVANIA, 1969.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11305

WATER RESOURCES INVESTIGATIONS IN MAINE, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11306

WATER RESOURCES INVESTIGATIONS IN TENNESSEE, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11307

THE GROUNDWATER FLOW SYSTEM IN THE DELMARVA PENINSULA,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 02A.
W72-11309

SUBSURFACE SITE CONDITIONS AND GEOLOGY IN THE SAN FERNANDO EARTHQUAKE AREA,
California Univ., Los Angeles. School of Engineering and Applied Science.
J. A. Johnson, Y. Kharraz, K. W. Campbell, N. A. Malpiede, and C. M. Duke.
Research Report UCLA-ENG-7206 Dec 1971, 118 p. Folder. 3 fig, 4 tab, append. OWRR B-144-CAL (1).

Descriptors: *Earthquakes, *Seismic studies, Geophysics, *Subsurface investigations, Velocity, Seismic properties, *California.
Identifiers: *San Fernando (Calif.).

Progress is reported in establishing the facts about dynamic subsurface properties and geological features in the area affected by the San Fernando earthquake of February 9, 1971. Special emphasis is given to the locations of accelerographs, seismoscopes and Seismological Field Survey aftershock instruments. Thirty shallow geophysical survey were made for determination of shear and compressional wave velocities, with damping measured at some sites. Deep velocity data were obtained from geophysical surveys by others. Soil mechanics data and water well borings by others were utilized. Published and ongoing geological studies were applied. Results are presented in the form of five geological cross-sections subsurface exploration models extending through basement complex to depths of 14,000 ft., a general geologic map, the shallow geophysical surveys, and selected data on damping.
W72-11316

WATER TABLE INVESTIGATION IN THE MESILLA VALLEY,
New Mexico State University. University Park. Dept. of Civil Engineering.
G. L. Richardson.
M. S. Thesis, 1971. 206 p, 20 fig, 24 tab, 1 plate, 21 ref, 7 append. OWRR B-016-NMEX (4), B-019-NMEX (4) and B-026-NMEX (4).

Descriptors: *Surface-groundwater relationships, *Mathematical models, *Model studies, *Computer models, *Water level fluctuations, New Mexico, Hydrologic budget, Groundwater movement, Water table, Water wells, Storage coefficient, Darcys law, Transmissivity, Water balance, Inflow, Outflows, Evaporation, Precipitation (Atmospheric), Seepage, Consumptive use (Water), Canals, Irrigation district.
Identifiers: *Mathematical groundwater model, *Groundwater investigation, *Rio Grande, Mesilla Valley, Groundwater resource, Groundwater budget, Storativity, Mass-continuity equation.

The objective was to develop and verify a mathematical model of the Mesilla Valley ground-water basin. All available geologic and hydrologic data were compiled and incorporated into a computer program that was developed by Willem Brutsaert of New Mexico Institute of Mining and Technology. The model was calibrated by adjusting the storativity of the aquifer until the computer generated data closely duplicated existing historic data on water table fluctuation. The storativity is a very important parameter which is poorly defined by actual data. A storativity of 20 percent produced close correlation between historic and computer generated data. Following verification of the model, several production runs were made to determine the sensitivity of water table fluctuations to changes in some imput parameters. These results indicate that the modeling efforts would

benefit greatly by the gathering of more comprehensive data concerning the storativity of the aquifer and the exchange of water between the Rio Grande and the ground-water reservoir. The hydrologic data compiled and used in the model are included. (Creel-New Mexico)
W72-11387

DEEP THERMAL STREAM IN THE DAGESTAN TERRITORY,
Scientific Council for Geothermal Studies, Moscow (USSR).
A. S. Dzhamalova.
Trans. available from the National Technical Information Center as NASA TT F-696, $3.00 in paper copy, $0.95 in microfiche. National Aeronautics and Space Administration Technical Translation Publication NASA TT F-696, May 1972. 122 p, 29 fig, 19 tab, 207 ref. (Translated from 'Glubinnyy Teplovoy Potok na Territorii Dagestana', Nauka Press, Moscow, 1969).

Descriptors: *Geothermal studies, *Thermal water, *Groundwater, *Thermal conductivity, *Sediments, Rocks, Clays, Limestones, Thermal springs, Geology, Sedimentology, Depth, Radioisotopes, Sampling, Analytical techniques, Rock properties, Thermal properties.
Identifiers: *USSR, *Dagestan (USSR).

Thermal conductivity of the various types of rocks comprising the sedimentary sheath of Dagestan A. S. S. R., was determined from 125 samples. Sandstones have the highest thermal conductivity (up to 8.9 mcal per cm per sec per deg C), and the clays have the lowest (up to 1.5 mcal per cm per sec per deg C). The coefficient of thermal conductivity for the same type rock increases with an increase in the depth of the deposit, which is related to the compression of the rock and is not dependent on its age. The magnitude of correction in the coefficient of thermal conductivity under natural conditions in comparison with laboratory conditions under the influence of moisture reaches 10-15% for the clays and 30% for the sandstones. Values were determined for the conductive thermal flow in 12 exploratory fields and differentiation of the conductive thermal flow was established in the different geologic-tectonic zones. The content of long-lived radioactive isotopes was determined in 160 samples of the various sedimentary rocks. The highest content of isotopes is in the clays, and the limestones have the lowest content. (Woodard-USGS)
W72-11444

GROUND-WATER INVESTIGATIONS IN OKLAHOMA,
Geological Survey, Oklahoma City. Water Resources Div.
J. H. Irwin.
In: Environmental Aspects of Geology and Engineering in Oklahoma; Symposium of Oklahoma Academy of Science, Stillwater, Dec. 4, 1970: Annals of the Oklahoma Academy of Science Publication No 2, p 58-70, 1971. 8 fig.

Descriptors: *Groundwater resources, *Oklahoma, *Groundwater potential, *Aquifer characteristics, Alluvium, Sandstones, Limestones, Pleistocene epoch, Water resources development, Overdraft, Waste water (Pollution), Irrigation, Investigations.

The geohydrologic framework of Oklahoma is summarized, some of the groundwater problems are listed, and the investigative programs are outlined. The fairly well distributed groundwater reservoirs are estimated to contain more than 300 million acre-feet of water valued at several billion dollars. Because of the critical need for scientific evaluation of groundwater in several parts of the State, the U. S. Geological Survey in cooperation with the Water Resources Board and the Oklahoma Geological Survey initiated, a program of reconnaissance and detailed studies several years ago which is continuing. Principal aquifer systems may be placed in four groups: (1) alluvial deposits along streams and valleys, (2) sandstone, (3) limestone including dolomite and gypsum, and (4) semiconsolidated sand and gravel under the High Plains. The States' groundwater problems include (1) overdevelopment of aquifers, (2) dangers from injection of wastes polluting water supplies, and (3) need for development of domestic and stock supplies in areas of no surface water. (Lang-USGS)
W72-11448

DRILLERS' LOGS OF WELLS IN HARRIS COUNTY, TEXAS, 1905-71,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W72-11449

GROUNDWATER IN LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 07C.
W72-11462

GEOHYDROLOGY OF JEFFERSON COUNTY, NORTHEASTERN KANSAS,
Kansas State Geological Survey, Lawrence.
For primary bibliographic entry see Field 04B.
W72-11464

HYDROLOGIC CONDITIONS DURING 1970 IN DADE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02E.
W72-11469

WATER RESOURCES INVESTIGATIONS IN NEVADA, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11653

WATER RESOURCES INVESTIGATIONS IN NEW HAMPSHIRE, 1968.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11654

WATER RESOURCES INVESTIGATIONS IN NORTH DAKOTA, 1969.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11675

GEOHYDROLOGY OF THE LOWER VERDIGRIS RIVER VALLEY BETWEEN MUSKOGEE AND CATOOSA, OKLAHOMA,
Geological Survey, Washington, D.C.
H. H. Tanaka.
Available from GPO, Washington, D C 20402 - Price 75 cents. Geological Survey Water-Supply Paper 1999-A, 1972. 23 p, 4 fig, 2 plate, 5 tab, 6 ref.

Descriptors: *Hydrogeology, *Surface-groundwater relationships, *Oklahoma, *Alluvium, Alluvial channels, Base flow, Water level fluctuations, Recharge, Water balance, Hydrologic budget, Aquifer characteristics, Water yield, Water quality, Discharge (Water).
Identifiers: *Verdigris River (Okla).

Alluvium is the principal aquifer along the Verdigris River between Muskogee and Catoosa, Okla. Yields of 1 to 10 gallons of water per minute, adequate for most domestic and stock uses, are available in almost all areas underlain by alluvium. In places where the proportion of gravel to fine material is high, yields ranging from 10 to 30 gpm are possible from large-diameter wells. Terrace deposits yield small amounts of water (1 to 10 gpm), adequate for most domestic and stock uses. Water-level fluctuations, in response to seasonal changes in recharge and discharge, range from 1 to 5 feet. Long-term fluctuations are about 10 feet in the alluvium and less than 5 feet in the terrace deposits. Recharge to the alluvium is mainly by precipitation. Recharge maintains groundwater levels above the level of the Verdigris River. Discharge from the alluvium is by seepage into the river and its tributaries and by evapotranspiration. Generally, the quality of the water in the alluvium and terrace deposits is suitable for domestic, stock, and irrigation uses. (Knapp-USGS)
W72-11677

PRELIMINARY APPRAISAL OF GROUND WATER IN STORAGE WITH REFERENCE TO GEOTHERMAL RESOURCES IN THE IMPERIAL VALLEY AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 04B.
W72-11678

2G. Water in Soils

RECLAMATION AND WATER MANAGEMENT (MELIORATSIYA I VODNOYE KHOZYAYSTVO).
Ministerstvo Melioratsii i Vodnogo Khozyaistva Ukrainskoi, Kiev (USSR).
For primary bibliographic entry see Field 05D.
W72-11120

EFFECTS OF WETTING ON DENSITY AND WATER PERMEABILITY OF FINE-TEXTURED SOILS (VLIYANIYE STEPENI UVLAZHNENIYA NA PLOTNOST' I VODOPRONITSAYEMOST' TYAZHELYKH POCHV),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
D. A. Tyutyunnik.
In: Melioratsiya i Vodnoye Khozyaystvo, No 17, p 35-41, Izdatel'stvo 'Urozhay', Kiev, 1971. 3 fig, 1 tab, 10 ref.

Descriptors: *Soil physical properties, *Soil density, *Bulk density, *Permeability, *Wetting, Moisture content, Field capacity, Porosity, Particle size, Soil structure, Soil profiles, Podzols, On-site investigations.
Identifiers: USSR, *Ukraine, Ivano-Frankovsk Oblast, Sod-Podzolid soils, Kolkhozes.

On-site investigations were carried out in 1961-69 to study the water and air regime of Sod-Podzolic gley, silty-loam soils at kolkhozes in the Ivano-Frankovsk Oblast in southwest Ukraine. A clear relationship was established between soil bulk density and moisture content. After drying, soil density in the humus-eluvial horizon increased from 1.2 to 1.4 g/cu cm, in the podzolic horizon from 1.3 to 1.68 g/cu cm, and in the illuvial horizon from 1.42 to 1.87 g/cu cm. Varying particle sizes and porosities accout for the sharp decrease in water permeability in the eluvial horizon and for the significant increase in water permeability in the illuvial horizon. Empirical formulas are given for calculation of more reliable bulk densities. (See also W72-11120) (Josefson-USGS)
W72-11122

LABORATORY DETERMINATION OF THE VAPOR DIFFUSION COEFFICIENT IN DESSICATED SOIL (LABORATORNYY OPYT PO OPREDELENIYU KOEFFITSIYENTA DIFFUZII PARA V ISSUSHENNOY POCHVE),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
V. G. Charnyy.
In: Melioratsiya i Vodnoye Khozyaystvo, No 17, p 42-45, Izdatel'stvo 'Urozhay', Kiev, 1971. 2 fig, 1 tab, 5 ref.

Descriptors: *Soil physics, *Water vapor, *Vapor pressure, *Diffusion, Humidity, Atmosphere,

Evaporation, Moisture content, Soil water movement, Porosity, Bulk density, Chernozems, Model studies.
Identifiers: USSR, *Ukraine, Vapor density, Water vapor movement, Maximum hygroscopicity, Dessication.

The effects of different humidities on diffusion of water vapors through a dessicated layer of southern Chernozem were investigated in the laboratory through the use of model techniques. Soil bulk density was 1.22 g/cu cm and porosity, 47%. The vapor diffusion coefficient in soil at low moisture content was similar to the molecular diffusion coefficient of water vapors in free air and varied between 0.17 and 0.26 sq cm/sec, the average of 4 determinations being 0.22 sq cm/sec. Density distribution of vapor sorbed by soil when soil thickness increases to 8 cm deviates from the linear relation and must be taken into account in calculating the diffusion coefficient. (See also W72-11120) (Josefson-USGS)
W72-11123

CHANGES IN NITROGEN REGIME OF PEAT SOIL AS A FUNCTION OF GROUNDWATER DEPTH (IZMENENIYE AZOTNOGO REZHIMA TORFYANOY POCHVY V ZAVISIMOSTI OT UROVNYA GRUNTOVYKH VOD),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
Kh. N. Starikov, N. K. Krasovskiy, and I. N. Yakovenko.
In: Melioratsiya i Vodnoye Khozyaystvo, No 17, p 46-53, Izdatel'stvo 'Urozhay', Kiev, 1971. 1 fig, 7 tab, 9 ref.

Descriptors: *Groundwater, *Water table, *Water levels, *Peat, *Nitrogen cycle, Ammonia, Nitrates, Nitrites, Organic matter, Soil moisture, Moisture content, Crops, Sugar beets, Oasts, Lysimeters, Seasonal.
Identifiers: USSR, *Ukraine, Rovno Oblast, Nitrogen losses, Agrochemistry.

Investigations were carried out in 1967-68 to study the nitrogen cycle of 2.5-3.5 m-thick lowmoor peat in the Rovno Oblast in the western Ukraine. The soil was encased in water-table lysimeters, 100 cm in diameter and 1.3-1.9 m deep. A drop in water-table depth from 70 cm after planting to 120-160 cm in the latter half of the growth period created conditions most favorable to the soil nitrogen regime. In 1967, at a constant water table of 80 cm, dry-matter weight and total nitrogen loss for sugar beets from one lysimeter were 1,266 g and 12.8 g, respectively, and at water tables ranging from 70 cm in spring to 160 cm in summer-1,659 g and 29.8 g. In 1968, at a groundwater depth of 80 cm, dry-matter weight and total nitrogen loss for oats were 870 g and 7.8 g respectively, and at water tables ranging from 70 cm to 160 cm-843 g and 13.21 g. The principal form of nitrogen in groundwater is ammonia. Nitrates are either missing or found in small amounts (0.3-2.4 mg of water/liter) during most of the growth period. Both nitrogen forms predominate in lysimeters with high water tables. (See also W72-11120) (Josefson-USGS)
W72-11124

EFFECTS OF WETTING ON NITROGEN REGIME OF OLD-PLOWED PEAT SOIL, BASED ON POT TESTS (VLIYANIYE STEPENI UVLAZHNENIYA NA AZOTNYY REZHIM STAROPAKHOTNOY TORFYANOY POCHVY (PO DANNYM VEGETATSIONNOGO OPYTA)),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
N. K. Krasovskiy.
In: Melioratsiya i Vodnoye Khozyaystvo, No 17, p 54-58, Izdatel'stvo 'Urozhay', Kiev, 1971. 4 tab, 13 ref.

Descriptors: *Wetting, *Moisture content, *Soil moisture, *Peat, *Nitrogen cycle, Nitrogen fixation, Nitrification, Denitrification, Nitrates, Ammonia, Organic matter, Crops, Barley, Soil analysis.
Identifiers: *USSR, *Ukraine, Rovno Oblast, Nitrogen losses, Pot tests, Mineralization.

Pot tests were conducted in 1968 to study mineralization of organic nitrogen in old-plowed Peat soil of the Chemernoye bog in the Rovno Oblast (western Ukraine). Conditions for mineralization of peat organic nitrogen and its uptake by barley were optimal at soil moisture contents of 60% and 75% of full moisture capacity. Soil nitrogen uptake by barley at these moisture contents was maximum and was 805.8 and 769.7 mg/pot, respectively. Plant nitrogen consumption increased with decrease in soil moisture content from 90% to 60% of full moisture capacity. Barley uptake of nitrate nitrogen was more intense than that of ammonium nitrogen under all soil-moisture conditions examined. Changes in total nitrogen content of Peat soil at different moisture contents were determined largely by rate of organic-matter decomposition, plant uptake of mineral nitrogen, and rate of biological nitrogen fixation in soil. Under optimal moisture conditions, total and unproductive nitrogen losses were minimal. (See also W72-11120) (Josefson-USGS)
W72-11125

METHODS FOR EFFECTIVE RECLAMATION OF SALINE CALCAREOUS PEAT SOILS IN THE UKRAINE (PRIYEMY EFFEKTIVNOGO OSVOYENIYA ZASOLENNYKH KARBONATNYKH TORFYANYKH POCHV USSR),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
B. I. Dem'Yanchik, L. V. Sushitskiy, and F. N. Dudinets.
In: Melioratsiya i Vodnoye Khozyaystvo, No 17, p 59-65, Izdatel'stvo 'Urozhay', Kiev, 1971. 3 tab, 7 ref.

Descriptors: *Land management, *Land reclamation, *Peat, *Soil types, Soil properties, Drainage, Drainage systems, Fertilizers, Nutrients, Nutrient requirements, Nitrogen, Phosphorus, Potassium, Crop production, Field crops, Grasses.
Identifiers: *USSR, *Ukraine, *Rovno Oblast, *Superphosphates, Granulated fertilizers, Phosphorus pentoxide, Phosphorus pentoxide, Phosphoric acid, Kolkhozes, Agrochemistry.

Calcareous Peat soils of the forest steppe of the Ukraine are extremely deficient in potassium and readily available phosphorus. Hydrophysical and agrochemical properties of lowmoor sedge-hypnum peat were investigated in 1968-69 in the 1,200-ha Kutyanskaya drainage system of the 'Kommunist' kolkhoz, Ostrog Rayon, Rovno Oblast. Application of at least 60 kg of P205/ha, along with potassium and copper fertilizers, is required to effectively reclaim the soils and to ensure high crop yields. The best field crops to be grown on these soils are mangel-wurzel and pea, and the best grass species of perennials are timothy and smooth bromegrass. (See also W72-11120) (Josefson-USGS)
W72-11126

THE MINIMUM SOIL MOISTURE AS AN INDICATION FOR IRRIGATION,
Institute of Water Engineering and Land Improvement, Sofia (Bulgaria).
For primary bibliographic entry see Field 03F.
W72-11217

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, CATRON COUNTY,
New Mexico State Univ., University Park, Dept. of Agronomy.
H. J. Maker, R. E. Neher, and J. U. Anderson.
Available from the National Technical Information Service as PB-210 811, $3.00 in paper copy, $0.95 in microfiche. New Mexico State University, Agricultural Experiment Station Research Report 229 1972, 49 p, 11 fig, 7 tab, 6 ref. OWRR B-015-NMEX (18).

Descriptors: *New Mexico, *Irrigable land, *Soil classification, *Land classification, Soil investigations, Agriculture, Irrigation.
Identifiers: *Catron County (N Mex), *Soil associations, *Irrigation potential, Soil interpretation, Soil characteristics, Soil description.

The suitability of soils in Catron County, New Mexico for irrigation is described. The acreage, general location, and relative capability of the soils for use in irrigated agriculture are given. The irrigation land classes were assigned primarily on the basis of soil data available from a general soil map. Although such general soil maps are often made by generalizing from large-scale detailed soil maps, this was possible only to a limited extent in Catron County. Detailed soil surveys were limited to irrigated lands and small areas of rangeland where special studies were conducted. The general soil map of this county, therefore, was prepared largely on the basis of a field reconnaissance together with interpretation of airphotos, topographic maps, geological maps, and other available information. The data were organized and presented on the basis of soil associations shown on the general soil map and on the irrigation land classification map. Catron County has about 4,414,700 acres, of which about 24 percent were considered suitable for irrigation. About 53,088 acres were in irrigation class 1; 311,156 acres in class 2; 399,583 acres in class 3; and 300,447 acres in class 4. The remaining 3,350,426 acres were in land class 6, which was not considered suitable for irrigation. Information also is provided on soil resources that can be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation, and wildlife uses. A general soil map and a classification of land for irrigation map, both in color are included.
W72-11311

FINITE ELEMENT SOLUTION OF UNSTEADY AND UNSATURATED FLOW IN POROUS MEDIA,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
J. C. Bruch, Jr., and G. Zyvoloski.
(1972), 22 p. 6 fig, 10 ref. OWRR A-039-CAL (1).

Descriptors: *Porousmedia, *Unsteady flow, *Finite element analysis, Mathematical studies, Flow.
Identifiers: Galerkin Process.

The nonlinear equation describing the unsteady and unsaturated, one-dimensional flow in porous media is formulated with the finite element representation employing the Galerkin approach. A linear shape function and two-dimensional triangular elements in space and time were used in solving the problem for several common forms of the diffusivity function. The results are compared with finite difference solutions as well as other numerical techniques.
W72-11313

CORRECTNESS OF THE CALCULATION METHOD FOR THE SOLUTION OF PROBLEMS ON MOISTURE TRANSFER IN SOIL,
V. A. Yangarber.
Sb Tr Po Agron Fiz. Vol 23. p 32-40. 1969.
Identifiers: *Mathematical studies, Movement.

A method of finite differences is suggested for numerical solution of nonsteady boundary-value problems describing the movement of soil moisture. Semi-implicit grid diagrams are constructed and their stability is proven by the maximum principle. The algebraic equations involved in this procedure are solved by matching techniques.--Copyright 1972, Biological Abstracts, Inc.
W72-11322

GENESIS OF GYPSUM SOLONCHAKS OF SOUTHERN KIRGHIZIA,
G. I. Roichenko.
Tr Kirg Nauchno-Issled Inst Pochvoved. Vol 2, p 92-100. 1969.
Identifiers: Drainage, Gypsum, *Kirghizia (USSR), *Saline soils, *Solonchaks, USSR.

The saline soils are formed under conditions of weak drainage in the presence of moderately mineralized groundwaters not under pressure. The gypsum is a weathering product of gypsiferous Tertiary rocks. The soil-forming rocks have considerable contents of carbonates. Chloride-sulfate and sulfate types of saline soil and groundwaters are predominant. Measures are recommended for the prevention of secondary salination.--Copyright 1972, Biological Abstracts, Inc.
W72-11335

EFFECT OF POLYMERS ON THE RESISTANCE OF SOILS TO EROSION,
For primary bibliographic entry see Field 04D.
W72-11337

WATER REGIME OF SOIL UNDER PROLONGED IRRIGATION AND FERTILIZATION,
For primary bibliographic entry see Field 03F.
W72-11338

GREEN MANURE IN EROSION CONTROL AND FERTILITY IMPROVEMENT OF ERODED SOILS,
For primary bibliographic entry see Field 04D.
W72-11339

EFFECT OF THE TEXTURE AND STRUCTURE OF SOIL ON ITS WATER-RAISING CAPACITY,
M. S. Tsyganov, and V. I. Reztsova.
Zap Voronezh S-Kh Inst. Vol 40, p 23-32. 1969.
Identifiers: *Chernozem soils, *Soil texture, *Soil structure, Capillary water.

Tubes (35 mm diameter, 130 cm tall) filled with sand, sandy loam, light and heavy loam, structural fractions 5-1 mm and 1-0.25 mm, and mixtures of these with the fraction <0.25 mm were immersed in water to a depth of 2 cm. The rising of water was observed for 25 days, and the moisture content of the filling in the tubes was determined according to layers at the end of the experiment. The capillary rise of water was very slow in crumbly and granular soils without an appreciable content of silt indicating that the water requirement of plants on these soils is probably not satisfied by moisture from deeper horizons. The observations were made on structural chernozem soils in the Voronezh Region.--Copyright 1972, Biological Abstracts, Inc.
W72-11344

SNOWMELT CONTROL ON BELORUSSIAN ERODED LOAMY SOD PODZOLIC SOILS,
For primary bibliographic entry see Field 04D.
W72-11345

COMPARATIVE DESCRIPTION OF THE MORPHOLOGICAL, CERTAIN PHYSICAL AND HYDROPHYSICAL PROPERTIES OF ZONAL CHERNOZEMS IN THE VORONEZH REGION,
V. N. Ovchinnikov.
Zap Voronezh S-Kh Inst. 40: p 61-70. 1969.
Identifiers: Capillary water, *Chernozems, Soil density, Soil moisture, Soil types, *Voronezh (USSR), *Clay loam.

The Voronezh Region is dominated by weakly leached, typical clayey, ordinary clayey, ordinary heavy-loamy and southern chernozems. The bulk density of the soils gradually increased with depth in the profile, from 1.07-1.12 to 1.30-1.69. Capillary moisture capacity (determined in loose soil within glass tubes 3 cm in diameter and 10 cm in length), was greatest in the arable horizon of typical chernozem (58-60%) and lowest in ordinary chernozem (50-52). Gradually decreasing down the profile, it levelled out to 42-46% in all these soils at a depth of 145-150 cm.--Copyright 1972, Biological Abstracts, Inc.
W72-11349

SOME SOILS GROUPS IN THE SOUTH OF THE KIROV REGION,
E. M. Isupova.
Uch Zap Kirov Gos Pedagog Inst. 33. p 60-74. 1969.
Identifiers: *Kirov (USSR), Soils, *Soil texture, Vegetation, *Clay soils, *Gleyey soils.

The soils in the Kichma-Nemda interfluve and the valley of Toima River are floodplain sod soils (gley and gleyey), light-gray forest, sod-weakly podzolic, sod-calcareous (ordinary, leached and podzolized), dark-gray forest and laminated floodplain soils. The texture of soils and soil-forming rocks with a brief agrochemical characterization is described. The soil associations result from the local vegetation and geological-geomorphological conditions.--Copyright 1972, Biological Abstracts, Inc.
W72-11350

PHYSICAL PROPERTIES OF CERTAIN BOG--SOILS IN THE BELORUSSIAN SSR AND THEIR AMELIORATION,
M. I. Afanas'Ew.
Vyestsi Akad Nauk Byelarus SSR Ser Sel'-Skahaspad Nauk. 2. p 19-22. 1969.
Identifiers: Absorption, Amelioration, *Belorussian-SSR, *Bog-soils, Density, *Gley horizons, Logging, Permeability, Soils, USSR.

Temporary waterlogging of bog-soils by atmospheric precipitation is due to the high density of gley horizons and low water permeability of the soils. Deep loosening is a radical ameliorative practice provided the precipitation does not exceed 700 mm, and the compact horizons are located at depth not exceeding 1 m. Deep loosening promotes water-holding capacity and permeability to water. Excess water is absorbed by the soil in spring and utilized by the plants in summer.--Copyright 1972, Biological Abstracts, Inc.
W72-11351

PESTICIDE MOBILITY IN SOILS: II. APPLICATIONS OF SOIL THIN-LAYER CHROMATOGRAPHY,
Agricultural Research Service, Beltsville, Md. Plant Science Research Div.
For primary bibliographic entry see Field 05B.
W72-11353

PESTICIDE MOBILITY IN SOILS: III. INFLUENCE OF SOIL PROPERTIES.
Agricultural Research Service, Beltsville, Md. Plant Science Research Div.
For primary bibliographic entry see Field 05B.
W72-11354

EFFECT OF CERTAIN SURFACTANTS AND OTHER ORGANIC SUBSTANCES ON THE PHYSICAL PROPERTIES OF SOIL AND DEVELOPMENT OF PLANTS,
O. Dobozi, M. Lakatosh, and F. Mate.
Zh Prikl Khim. Vol 43, No 3, p 639-645. 1970.
Identifiers: Absorption, Capillary, Carboxymethyl cellulose, *Plants, Resistant, *Soils, *Surfactants.

Treatment of samples of brown forest soil with anion-active substances (tensides) appreciably increased their content of water-resistant aggregates of 2.5-3 mm, while that of smaller aggregates diminished. The content of large aggregates in soil was diminished by complexers ('evazin,' carboxymethyl cellulose) and cation-active 'tensides,' while the content of small aggregates increased. Efficacy of doses 1%, 0.1%, 0.01% differed for different 'tensides.' Large artificial aggregates impregnated with the 'tensides' proved more stable than natural nonimpregnated aggregates. The capillary absorption of solutions was hardly affected by anion-active 'tensides,' but increased appreciably due to cation-active ones (in concentration 0.01%). Sprouting of wheat on 0.01 and 0.001% solutions of 'tensides' increased the number and total mass of the sprouts.--Copyright 1972, Biological Abstracts, Inc.
W72-11391

OPTIMIZATION OF AVAILABLE MOISTURE IN SOIL,
B. N. Michurin, and V. G. Onishchenko.
Dokl Otd Komis Geogr O-Va SSSR. 13. p 124-129, 1970.
Identifiers: Bulk, Density, *Soil moisture, *Optimization, Surface.

Moisture contents of various soils were determined at pF 2.5 and 4.2, respectively, corresponding to field capacity and wilting percentage, the specific surface of soil (10-300 m2/g) and its bulk density (1-2.1 g/cm3) being used as the variables. The observed differences between natural soils with respect to their moisture characteristics were mainly due to differences in their specific surfaces and bulk densities. The field capacity of a soil varies continuously with its specific surface and is affected by compaction. Compaction with a specific surface > 70 m2/g decreases the available moisture content. Soil in the experiments consisted of various mixtures of silt (0.05-0.01 mm) and bentonite with definite specific surfaces.--Copyright 1972, Biological Abstracts, Inc.
W72-11416

IMPROVING THE FERTILITY OF SANDY SOILS BY CLAYING,
A. A. Nizova.
Dokl Otd Komis Geogr O-Va SSSR. 13. p 155-161. 1970.
Identifiers: Claying, *Fertility, Moisture, *Sands, Soils.

Claying in conjunction with liming and peat-manure compost improved crop yields for 3 yr. The best effect was obtained with 60 tons/ha clay. Clayed soils also had a larger content of available moisture and improved chemical properties.--Copyright 1972, Biological Abstracts, Inc.
W72-11417

SOIL PROPERTIES AFFECTING THE RETENTION OF PHOSPHORUS FROM EFFLUENT,
Department of Agriculture, Agassiz (British Columbia). Research Station.
For primary bibliographic entry see Field 05B.
W72-11430

THE INFLUENCE OF LIQUID SURFACE TENSION AND LIQUID-SOLID CONTACT ANGLE ON LIQUID ENTRY INTO POROUS MEDIA,
California Univ., Riverside.
C. L. Watson, J. Letey, and M. A. Mustafa.
Soil Science, Vol 112, No 3, p 178-183, 1971. 6 fig, 1 tab, 8 ref. OWRR B-072-CAL (4).

Descriptors: *Soil water movement, *Infiltration, *Porous media, *Surface tension, Testing, Analytical techniques, Soil properties, Water pollution sources, Surfactants, Repellents, Wettability, Liquids, Aqueous solutions.
Identifiers: Ethanol solutions.

Liquid surface tension and liquid-solid contact angle parameters were used to estimate relative initial rates of liquid entry into soil as a function of surface tension. The method can predict the surface tension at which infiltration rate will be maximized, and this value is readily found for water-repellent soils. Expected relative rates were

derived as a function of surface tension for two water-repellent and two wettable soils and were compared with actual infiltration and capillary rise data for the same media using both a series of aqueous ethanol and surfactant solutions. There was reasonable agreement between expected and actual rates of entry of ethanol solutions using both infiltration and capillary rise techniques. However, actual infiltration data with surfactant solutions and repellent soils did not give the expected result. The anomaly was attributed to the adsorption of surfactant by the soil with a resultant increase in surface tension. This effect was not a major factor the Pachappa sandy loam, which gave good agreement between expected and measured data. (Woodard-USGS)
W72-11463

EFFECT OF TWO NONIONIC SURFACTANTS ON PENETRABILITY AND DIFFUSIVITY OF SOILS,
California Univ., Riverside.
M. A. Mustafa, and J. Letey.
Soil Science, Vol 111, No 2, p 95-100, 1971. 4 fig, 3 tab, 9 ref. OWRR B-072-CAL (2).

Descriptors: *Soil water movement, *Surfactants, *Penetration, *Diffusivity, *Infiltration rates, Irrigation, Testing, Analytical techniques, Agricultural, Water conservation.
Identifiers: Nonionic surfactants, Water-repellent soil, Alkyl polyopyethylene ethanol.

The effects of two nonionic surfactants, Soil Penetrant and Aqua Gro, on penetrability and diffusivity of 0.01 N CaSO4 solution in wettable (Pachappa) and water-repellent (Morris Dam) soils were studied. The usefulness of equations in predicting unsaturated flow of surfactant-treated water in soils was also evaluated. The addition of the two surfactants either slightly decreased or had no effect on penetrability and diffusivity of .01 N CaSO4 solution in the wettable Pachappa soil. The slight decrease was attributed to decrease in aggregate stability of the soil. Addition of the two nonionic surfactants increased penetrability and diffusivity of .01 N CaSO4 in the water-repellent Morris Dam soil. The equations held to some extent in the wettable system. Slight deviations were explained on the basis of change in geometry. These equations failed to predict penetrability and diffusivity in the water-repellent system. (Woodard-USGS)
W72-11658

SOIL MOISTURE INFLUENCE ON TREATMENT AND EXTRACTION OF DDT FROM SOILS,
Agricultural Research Service, Beltsville, Md. Maryland Plant Science Research Div.
For primary bibliographic entry see Field 05A.
W72-11714

THE RAPID DETERMINATION OF TUNGSTEN IN SOILS, STREAM SEDIMENTS, ROCKS AND VEGETATION,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry.
For primary bibliographic entry see Field 05A.
W72-11730

NOTE ON THE SOILS OF THE LORRAINE LIASSIC (JURASSIC) PLATEAU (REGION OF NOMENY),
Ecole National Superieure d'Agronomie, Nancy (France). Laboratoire de Pedol.
A. Guckert, A. Girard, and F. Jacquin.
Bull Assoc Fr Etud Sol. 2. p 29-51. 1970. Illus. Maps.
Identifiers: *France, *Jurassic plateau, Liassic, Lorraine, Nomeny, Plateau, *Soils.

A systematic charting, on a scale of 1/25,000 made it possible to establish general lines concerning the characteristics, systematics (soil geology) and evolution of the heavy soils of the liassic plateau of Lorraine and to outline the hydromorphous zones deserving drainage priority. Three large groups of soils are distinguished as to origin: alluvial soils, heavy soils on a marno-calcareous substrate, and brownish hydromorphous soils superposed on limonite formations.--Copyright 1972, Biological Abstracts, Inc.
W72-11734

2H. Lakes

NONDESTRUCTIVE DETERMINATION OF ELEMENTS IN SPECIFIC FRESHWATER MICROPLANKTON BY ACTIVATION ANALYSIS,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 05A.
W72-11093

ON THE EXPERIMENT ON DESTRATIFICATION OF RESERVOIR WATER BY AIR--BUBBLING, (SECOND REPORT), (IN JAPANESE),
For primary bibliographic entry see Field 05G.
W72-11326

HARVEST AND SURVIVAL OF RAINBOW TROUT INFECTED WITH SANGUINICOLA DAVISI WALES,
California State Dept. of Fish and Game, Sacramento.
R. R. Rawstron.
Calif Fish Game. Vol 57 No 4 p 253-256. 1971.
Identifiers: Fish harvest, *Rainbow trout, Salmo gairdneri, *Sanguinicola davisi, Survival.

Rainbow trout, Salmo gairdneri, heavily infested with the blood fluke, Sanguinicola davisi, showed good annual harvest and survival rates, good growth, and a low cost to the angler's creel in an intermediate type of reservoir with few limnetic predators or competitors.--Copyright 1972, Biological Abstracts, Inc.
W72-11330

COMPARATIVE ASPECTS OF THE BIOLOGY OF PIKE, ESOX LUCIUS L., IN TWO SCOTTISH LOCHS,
Glasgow Univ. (Scotland). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W72-11331

FACTORS AFFECTING ABUNDANCE OF LAKE HERRING (COREGONUS ARTEDII LEUEUR) IN WESTERN LAKE SUPERIOR,
National Marine Fisheries Service, Woods Hole, Mass. North Atlantic Fisheries Research Center.
E. D. Anderson, and L. L. Smith, Jr.
Trans Am Fish Soc. Vol 100, No 4, p 691-707. 1971. Illus. Map.
Identifiers: *Abundance, *Cisco, Competition, Copepods, Coregonus artedii, Coregonus hoyi, Fisheries, Fish diets, Osmerus mordax, Plankton, Smelt, *Lake Superior.

A field and laboratory study was conducted in 1965-1968 to investigate factors affecting C. artedii abundance in western Lake Superior. Commercial landings in Nov.-Dec. in the Duluth-Superior area dropped from 1,117,000 lb in 1954 to 2000 lb in 1966. Wisconsin catches also declined markedly. Abundance and fishing intensity indices decreased with landings. Commercial catches and abundance of chubs (C. spp.) and smelt (Osmerus mordax) increased simultaneously with the herring reduction. Biological characteristics of Duluth-Superior and Apostle Islands (Wisconsin) herring stocks were examined and compared. Herring eggs were more abundant and viable in the latter area, and laboratory hatching success was significantly greater for Apostle Islands eggs. Herring larvae were generally more abundant and smaller in the Apostle Islands; distribution and growth did not differ between areas. Abundance of larvae in both areas declined sharply in June-July. Average age of adult herring in commercial catches increased from 3.9 yr in 1950-1959 tp 5.1 in 1966-1968 but showed no significant difference between areas. Percentage of females did not show a trend from 1960-1968; however, the 1968 percentage of 85.0 was the greatest since 1962. Percentage of females increased with age. Average length and weight increased from 11.3 inches and 0.33 lb in 1950-1959 to 13.4 in and 0.67 lb in 1966-1968. Average number of eggs/oz of fish increased from 842 in 1950-1954 to 1105 and 1019 in the Duluth-Superior and Apostle Islands areas, respectively, in 1966-1967. Smelt was the most abundant species in both areas and more abundant at Duluth-Superior. Zooplankton were more abundant at Duluth-Superior. Sediment soil in the Duluth-Superior area contained a higher percentage of silt and organic matter than soil in the Apostle Islands and was possibly related to lower egg viability in the former area. Correlations between fishing intensity and herring abundance suggest that overfishing was not the major factor in the decline of the species. Predation was not a serious influence on herring. Food of herring, bloaters (C. hoyi), and smelt was quite similar during early stages. Herring larvae consumed exclusively copepods. Food similarities and highly significant negative correlations between herring and bloater abundance and herring and smelt abundance suggest that competition for food at the critical larval stage was likely the major influence in the lake herring decline.--Copyright 1972, Biological Abstracts, Inc.
W72-11334

DEVELOPMENT OF DOMINANT YEAR CLASSES IN A YELLOW PERCH (PERCA FLAVESCENS) POPULATION,
Cornell Univ., Ithaca, N.Y. Dept. of Conservation.
J. L. Forney.
Trans Am Fish Soc. Vol 100, No 4, p 739-749. 1971. Illus.
Identifiers: *Dominant year classes, Perca flavescens, Fish populations, Predation, Trawling, *Yellow perch.

Abundance of young-of-the-year yellow perch in Oneida Lake, New York was estimated in 1959 through 1968 by shore seining in July and trawling in late summer. Seine and trawl catches were high in 1960, 1962, 1964, and 1968 and catches of age I+ perch in subsequent yr confirmed that these were dominant yr classes. Variation in numerical size of yr classes was less in the first yr than in the second which indicated a divergence in yr class abundance. Estimates of mortality based on the catch in trawls from Aug. to Oct. confirmed that weak yr classes generally experienced higher mortality than strong yr classes, thus mortality was depensatory. Changes in yr class biomass and estimates of perch consumed by the walleye population were consistent with the assumption that depensatory mortality was caused by predation.--Copyright 1972, Biological Abstracts, Inc.
W72-11341

THE ROLE OF THE GROWTH OF PHYTOPLANKTON UNDER ICE IN PRODUCING ORGANIC MATTER IN LAKE BAIKAL,
For primary bibliographic entry see Field 05C.
W72-11409

IMPROVED METHODS FOR DETERMINING CONTENTS OF CHLOROPHYLL, PROTEIN, RIBONUCLEIC ACID, AND DEOXYRIBONUCLEIC ACID IN PLANKTON POPULATIONS,
Nagoya Univ. (Japan). Research Inst. of Biochemical Regulation.
For primary bibliographic entry see Field 05A.
W72-11410

THE EFFECT OF LIGHT ON THE PHOTOSYNTHESIS RATE OF THE PHYTOPLANKTON OF THE SUPERFICIAL STRATA OF THE WATER,
For primary bibliographic entry see Field 05C.
W72-11411

SURVEY OF THE PLANT ASSOCIATIONS OF THE SOUTHERN PART OF EAST GERMANY: I. THE ASSOCIATIONS OF AQUATIC PLANTS,
For primary bibliographic entry see Field 05C.
W72-11429

FISH OF LAKE VYGONOVSKOE AND FISHERY. II,
Belorussian State Univ., Minsk (USSR).
F. N. Voronin, and V. V. Krylov.
Vestn Zool. Vol 5, No 3, p 40-44. 1971. English summary.
Identifiers: Abramis brama, Carassius auratus gibelio, Carassius carassius, Esox lucius, *Fish populations, Fishery, Perca fluviatilis, Rutilus rutilus, USSR, *Lake Vygonovskoe.

Characteristic morphological characters, growth rate and catch of predatory and some other species of fish in Lake Vygonovskoe are given. Fishery statistics for 1955-1967 show that the following species are of the greatest importance: Carassius auratus gibelio-55.5% , Esox lucius- (19.1%), Rutilus rutilus-5.45%, C. carassius-13%; Abramis brama-0.64% and Perca fluviatilis- (0.39%). As a result of repairs in the Oginsky canal, the water level in the lake became 0.5-0.6 m higher. This created an additional spawning and fattening area, which made it possible to increase acclimatization of C. auratus gibelio and its productivity in the lake from 13.5 kg/ha in 1948-1954 to 62.8 kg/ha in 1955-1967. C. auratus gibelio and E. lucius as well as A. brama, should be considered as promising fishery species for the lake.--Copyright 1972, Biological Abstracts, Inc.
W72-11433

ECOLOGICAL STUDIES ON CHIRONOMIDS IN LAKE SUWA: I. POPULATION DYNAMICS OF TWO LARGE CHIRONOMIDS, CHIRONOMUS PLUMOSUS L. AND SPANIOTOMA AKAMUSI TOKUNAGA,
Shinshu Univ., Matsumoto (Japan). Faculty of Science.
H. Yamagishi, and H. Fukuhara.
Oecologia (Berl). Vol 7, No 4, p 309-327. 1971. Illus. Map.
Identifiers: *Abundance, *Diptera, Chironomus plumosus, Ecology, Japan, Lake Suwa, Population, Seasonal, Spaniotoma akamusi.

Populations dynamics of C. plumosus and S. akamusi in Lake Suwa were studied through a 4-yr period from 1967 to 1970. Based on the daily catches of midge by means of light trap, 3 emergence periods in a year were confirmed in C. plumosus (April-May, June-July and Aug.-Oct.) and only 1 in S. akamusi (Oct.-Nov.). C. plumosus produces 3 generations yearly in the littoral region. In the profundal region, however, it usually lacks the second generation and some part of the larvae of the first generation emerges finally in the third emergence period. Larvae of S. akamusi disappeared from the surface layer of mud bottom in May as the result of their burrowing. Pupation and emergence took place after their reappearance at the surface layer in Sept. In the imagines of C. plumosus trapped through an emergence period, males as a rule predominated over females (males 50-83%). The predominance of males over females was even more expressed in S. akamusi (males 83-93%). Population density of larvae of C. plumosus attained its maximum in June (c. 1200-5400 individuals/m2 in the profundal region) and in Oct. (1500 to 2100/m2 in the same region) with the appearance of newly hatched larvae in the lake bottom. The maximum of biomass appeared either in correspondence to that of population density or a little later, and reached 15-90 and 10-27 g fresh weight/m2 in the above-mentioned periods, respectively. Population density of larvae of S. akamusi reached a maximum (700 to 4800 individuals/m2 in the profundal region) in the period from Dec. to March. The maximum biomass was found in March (10-96 g fresh wt./m2) when the growth of the larvae had been almost completed. Survival rate of wintered larvae of C. plumosus was very low (6-7%) in 1968 and 1969, whereas it amounted to about 70% in 1970, followed by an unusually intensive emergence. The quantity of pupae produced in an emergence period was estimated based on the numbers of larvae before and after emergence. The total amount of pupae produced per year was estimated at 268-354 tons in C. plumosus and at 10-168 tons in S. akamusi for the whole lake. A certain quantitative relationship was found between the total number of trapped imagines and the estimated number of pupae produced in an emergence period in both species.--Copyright 1972, Biological Abstracts, Inc.
W72-11434

AN ANALYSIS OF COLONIZATION OF FRESHWATER MICROORGANISMS: I. COLONIZATION IN 17 STATIONS IN THE 5 LAKES OF MT. FUJI. (IN JAPANESE),
Tokyo Seitoku Coll. (Japan).
M. Suzuki.
Zoll Mag. Vol 80, No 6, p 191-201. 1971. Illus. English summary.
Identifiers: Actinopoda, Arachnomorpha, Ciliata, Colonization, Crustacea, *Mount Fuji, Gastrotricha, Japan, Lakes, *Microorganisms, Oligochaeta, Rhizopoda, Rotatoria, Species, Stations, Tardigrada, Turbellaria.

The individual densities of the community in 10 ml interstitial water at 17 sampling stations, each with 3 habitats at 6 localities, varied with the highest density at the littoral region of Lake Yamanaka and the lowest at the gravel area of Lake Motosu. In every case the most abundant class was Flagellata, followed by Ciliata. The population of Rhizopoda, Gastrotricha, Rotatoria and Nematoda was, without exception, richest in the mosses, and that of Ciliata was richest in the gravels. The composition of 330 spp. was: Rotatoria = 40.1%, Ciliata = 23.1%, Rhizopoda = 22.8%, Gastrotricha = 4.5%, Crustacea = 3.0%, Arachnomorpha = 2.4%, Actinopoda and Tardigrada = 1.2%, and Oligochaeta and Turbellaria = 0.9% (flagellates and nematods undetermined). The total number of species of each community ranged from 19 to 77, the richest in the mosses of Lake Kawaguchi and the fewest in the gravels of Lake Motosu. As to the relationship between the species densities and the habitats the general trend was that the majority of Ciliata, Oligochaeta, Rhizopoda, Turbellaria, Gastrotricha, Tardigrada and Arachnomorpha, especially of the latter 6 classes, evolved towards the xerophilous, while Crustacea towards the hydrophilous. Actinopoda and Rotatoria, however, remained in the hygrophilous biotope. The so-called 'pioneer' species around Mt. Fuji could be considered to fulfill at least the following 5 conditions: marine psammon dweller, smaller than 50 x 50 x 100 microns in size, producer or primary consumer, quick cyst former, and cosmopolitan. They include the following spe cies: Rhizopoda: Thecamoeba verrucosa, Assulina muscorum, Centropyxis aerophila, Corythion dubium, Euglypha laevis, Heleopela rosea, Nebella collaris, Trinema enchelys, Ciliata: Lacrymaria sp., Mesodinium sp., Coleps sp., Lionotus fasciolata, Frontonia sp., Colpoda inflata, Glaucoma sp., Cyclidium elongata, Rotatoria: Proales sp., Monostyla closterocerca, Lepadella patella, Colurella colurus, Cephalodella gibba and Bryceella sp.--Copyright 1972, Biological Abstracts, Inc.
W72-11437

LAKE ERIE--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.

Available from NTIS, Springfield, Va 22151 as PB-210 919, $3.00 in paper copy, $0.95 in microfiche. Water Resources Scientific Information Center Report WRSIC 72-209, June 1972. 240 p, 221 ref.

Descriptors: *Bibliographies, *Abstracts, *Water resources, *Information retrieval, *Lake Erie, Publications, Documentation, Indexing, Classification, Information exchange, Hydrology, Data storage and retrieval.

This bibliography, containing 221 abstracts is one in a series of planned bibliographies in water resources produced wholly from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 41,521 abstracts covering SWRA through May 15, 1972 (Volume 5, Number 10). Abstracts with full bibliographic details are listed in ascending Accession Number order. A descriptor index is made up of a fraction of the total descriptors and identifiers by which each paper in this bibliography has been indexed. These descriptors represent weighted terms that best describe the information content and are indicated by asterisks. Through permutation, each word in a multiple-word descriptor or identifier is made to file in its normal alphabetic order, thus affording a multiple access to each abstract. Another index lists the authors alphabetically and gives page numbers for the abstracts. (Woodard-USGS)
W72-11440

LAKE ONTARIO--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.

Available from NTIS, Springfield, Va 22151 as PB-210 920, $3.00 in paper copy, $0.95 in microfiche. Water Resources Scientific Information Center Report WRSIC 72-212, June 1972. 200 p, 129 ref.

Descriptors: *Bibliographies, *Abstracts, *Water resources, *Information retrieval, *Lake Ontario, Publications, Documentation, Indexing, Classification, Information exchange, Hydrology, Data storage and retrieval.

This bibliography, containing 129 abstracts is one in a series of planned bibliographies in water resources produced wholly from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 41,521 abstracts covering SWRA through May 15, 1972 (Volume 5, Number 10). A descriptor index is made up of a fraction of the total descriptors and identifiers by which each paper in this bibliography has been indexed. These descriptors represent weighted terms that best describe the information content and are indicated by asterisks. A comprehensive index represents all of the descriptors and identifiers by which each paper in this bibliography has been indexed. Through permutation, each word in a multiple-word descriptor or identifier is made to file in its normal alphabetic order, thus affording a multiple access to each abstract. Another index lists the authors alphabetically and gives the page numbers for abstracts. Abstracts with full bibliographic details are listed in ascending Accession Number order. (Woodard-USGS)
W72-11441

GLACIER DAMMED LAKES AND OUTBURST FLOODS IN ALASKA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11445

WINTER CLIMATOLOGY AND ICE CHARACTERISTICS: ST. MARYS RIVER-WHITEFISH BAY WATERWAY,
United States Lake Survey, Detroit, Mich.
For primary bibliographic entry see Field 02C.

W72-11447

NEW DATA ON LAKES IN SOVIET CENTRAL ASIA (NOVYYE SVEDENIYA OB OZERAKH SREDNEY AZII),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
A. M. Nikitin, and V. N. Reyzvikh.
In: Gornaya gidrologiya; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 54 (69), p 113-116, 1970. 2 tab, 5 ref.

Descriptors: *Hydrography, *Lakes, *Lake morphometry, *Lake morphology, Lake basins, River basins, Mountains, Elevation, Runoff, Bodies of water.
Identifiers: USSR, *Soviet Central Asia, Lowlands.

Tabulation of lakes in Soviet Central Asia was based on surface area, river-basin distribution, and elevation. Excluding the Aral Sea and Lake Balkhash, the total number of lakes is 7,181 and their total surface area is 10,443 sq km. The number of lakes having a surface area of less than 1.0 sq km is 6,782, and the number of lakes with a surface area of more than 100 sq km is 6, their expanse ranging from 719.05 sq km to 7,619 sq km. The number of lowland and mountain lakes is 4,154 and 2,956, respectively, and their total surface areas are 2,921 sq km and 7,517.64 sq km. Lakes cover 0.43% of the land area in Central Asia as compared with 0.86% in the Caucasus, 3.9% in northern Kazakhstan, and 10.7% in Karelia. (See also W72-11450) (Josefson-USGS)
W72-11459

CONDITION FACTORS AND LENGTH--WEIGHT RELATIONSHIPS OF THE FLATHEAD CATFISH, PYLODICTIS OLIVARIS (RAFINESQUE), IN LAKE CARL BLACKWELL,
Okla. State Univ., Stillwater. Okla. Coop. Fish. Unit.
P. R. Turner, and R. C. Summerfelt.
Proc Okla Acad Sci. 51: 36-40, 1971.
Identifiers: *Catfishes, Lakes, Mathematical models, *Oklahoma, Pylodictis olivaris, *Lake Carl Blackwell.

Condition factors are presented for 432 flathead catfish and length-weight relationships for 224 flathead catfish collected in Lake Carl Blackwell in 16 mo., from June 1967 through Sept. 1968. The condition factor (KTL) for flathead catfish varied with total body length. A curvilinear relationship of average K factor and total length gave a better fit than did a linear relationship for fish 20 mm through 519 mm. For fish 518 mm through 879 mm total length, a linear relationship gave a better fit. Females had a larger KTL factor than males, but the KTL varied with season. The greatest KTL values occurred in prespawning females. The average KTL for the 124 female and 90 male fish used for computation of length-weight relationships were 1.30 and 1.25, respectively. The length-weight relationship (logarithmic form) was (Log10 W = a+b Log10 L): Log W =-5.423 + 3.189 Log L.--Copyright 1972, Biological Abstracts, Inc.
W72-11551

EFFECTS OF VOLCANIC ASHFALLS ON CHEMICAL AND SEDIMENT CHARACTERISTICS OF TWO ALASKAN LAKES,
Alaska Univ., College, Inst. of Marine Science; and Washington Univ., Seattle, Dept. of Oceanography.
R. J. Barsdate, and R. C. Dugdale.
Journal Fisheries Research Board of Canada, Vol 29, No 3, p 231-236, 1972. 3 fig, 2 tab, 16 ref. NSF Grant G12169.

Descriptors: *Volcanoes, *Sediments, *Alaska, *Lakes, Chemical properties, Oligotrophy, Diatoms, Productivity, Runoff, Silica, Bottom sediments, Sedimentation rates.
Identifiers: Volcanic ashfalls, Mount Katmai (Alaska), Afognak Island (Alaska), Upper Jennifer Lake (Alaska), Little Kitoi Lake (Alaska).

Nature and extent of changes in sediment composition following volcanic ashfalls and approximate time scale involved in reestablishment of mature, pre-ashfall sediment conditions were evaluated, particularly to determine if modern lake sediments are still influenced by the 1912 Mt. Katmai eruption. Data and information on other southwest Alaskan lakes, were examined for indications of change in chemistry and fertility. At approximately 25 m depths, cores from two lakes on Afognak Island, 150 km southeast of the Aleutian volcanic arc, indicated that several ashfalls have formed continuous layers over the lake basins, at least partially returning the lakes to a juvenile state with respect to their sediments. Primary productivity was measured; results of 24-hour vertical series in situ were integrated, giving rate of carbon fixation per unit surface area. Above each ash layer, abundant diatom remains were found. The transition to mature lake conditions during several hundred years after each ashfall, followed a pattern characterized by decreasing diatom abundance and gradual increases in organic matter and clay-size inorganic particulates. High silica concentrations occurred in lakes within the area covered by the 1912 Mt. Katmai ashfall. (Jones-Wisconsin)
W72-11569

THE LIMNOLOGICAL ROLE OF AQUATIC MACROPHYTES AND THEIR RELATIONSHIP TO RESERVOIR MANAGEMENT,
Atomic Energy Commission, Aiken, S.C. Savannah River Ecology Lab.
For primary bibliographic entry see Field 05C.
W72-11574

PHYTOPLANKTON PRODUCTIVITY IN A WYOMING COOLING-WATER RESERVOIR,
Utah Univ., Salt Lake City. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W72-11575

EFFECTS OF STORAGE AND MAINSTREAM RESERVOIRS ON BENTHIC MACROINVERTEBRATES IN THE TENNESSEE VALLEY,
Tennessee Valley Authority, Muscle Shoals, Ala. Environmental Biology Branch.
For primary bibliographic entry see Field 05C.
W72-11576

PHYTOPLANKTON PRODUCTIVITY RESPONSE TO NUTRIENTS CORRELATED WITH CERTAIN ENVIRONMENTAL FACTORS IN SIX TVA RESERVOIRS,
Tennessee Valley Authority, Muscle Shoals, Ala. Environmental Biology Branch.
For primary bibliographic entry see Field 05C.
W72-11578

THE DYNAMICS OF DENSITY-STRATIFIED RESERVOIRS,
Tennessee Valley Authority, Norris. Engineering Lab.
W. O. Wunderlich.
In: Reservoir Fisheries and Limnology, p 219-231. Special Publication No. 8, American Fisheries Society, Washington, D.C., 1971. 16 fig, 16 ref.

Descriptors: *Hydrodynamics, *Density stratification, Reservoirs, Water quality, Temperature, Dissolved oxygen, Tennessee Valley Authority, Velocity, Solar radiation, Heat transfer, Conduction, Convection.
Identifiers: *Tennessee Valley reservoirs.

Inflow and outflow play a major role in the development of water quality patterns in most reservoirs. If density stratification is present, water movements inside the reservoir can become complex. If denser layers are encountered, a second impoundment similar to that at the reservoir entrance occurs from which the underflow is lifted into a layer corresponding to its density to become an interflow. The interflow, overflow, or underflow result from the inflow density. The location of the turbine intake determines the zones from which most water is withdrawn. From reservoir to reservoir and even changing with the seasons in the same reservoir, the combination of inflow types and withdrawal patterns are different, resulting in great variety of flow patterns. Solar radiation penetration and free convective water movements are important factors in the water quality development of the surface layer. These reservoir dynamics and their influence on water quality are illustrated by selected data from TVA field investigations. Direct velocity measurements were made on several reservoirs to study flow mechanics; isotopic current analyzer was used to detect very slow velocities under field conditions. (Jones-Wisconsin)
W72-11579

THE ECOLOGY AND PRODUCTION OF COPEPODS, PARTICULARLY THERMOCYCLOPS HYALINUS, IN THE TROPICAL LAKE GEORGE, UGANDA,
Royal Holloway Coll., Englefield Green (England). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W72-11581

FECUNDITY, AGE AND GROWTH, AND CONDITION OF CHANNEL CATFISH IN AN OKLAHOMA RESERVOIR,
Oklahoma State Univ., Stillwater. Oklahoma Cooperative Fishery Unit.
A. Jearld, Jr., and B. E. Brown.
Proc Okla Acad Sci. 51: 15-22. 1971. Illus. Map.
Identifiers: *Catfishes, Fecundity, Growth, Fish management, *Oklahoma, *Reservoirs, Spawning, *Lake Carl Blackwell.

From Oct., 1967 through Aug., 1968, channel catfish were collected, chiefly by gill nets, from 6 major sites in Lake Carl Blackwell, a 3000 acre, turbid, old (dam completed in 1937) reservoir. Life history information, which can aid in the management of the sport fishery in this and similar bodies of water, was obtained. Data on fecundity, age and growth, length-weight relationships and condition factors are presented. Size at age and condition factors are among the lowest reported in the literature. The evidence indicated a late May into early June spawning period.--Copyright 1972, Biological Abstracts, Inc.
W72-11582

THE ORIGIN OF DYSTROPHIC SWINGING BOGS IN AN ALKALINE LAKE: ECOLOGICAL-CENOLOGICAL STUDIES ON THE LAKE VELENCE (HUNGARY),
Eotvos Lorand Univ., Budapest (Hungary). Botanikus Kertje.
For primary bibliographic entry see Field 05C.
W72-11602

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
J. Rawson, H. L. Kunze, and H. J. Davidson.
Geological Survey Basic-data Report, 1972. 92 p, 10 fig, 37 tab, 9 ref.

Descriptors: *Water quality, *Chemical analysis, *Reservoirs, *Texas, *Basic data collections, Water analysis, Chemical properties, Water chemistry, Water temperature, Depth, Sampling, Surface waters, Laboratory tests.

Chemical analyses are tabulated for water samples collected at 64 reservoirs in Texas from October 1969 to September 1971. Comprehensive studies were made at 9 of the reservoirs, and samples were collected periodically from the other 55.

Maps showing locations of data-collection sites are included. (Woodard-USGS)
W72-11670

MANMADE POLLUTION AND AMERICA'S 100,000 LAKES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 05C.
W72-11702

BACTERIOPLANKTON QUANTITY AND BIOMASS IN FLOOD LAKES OF THE AMUR RIVER,
Tikhookeanskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva i Okeanografii, Vladivostok (USSR).
For primary bibliographic entry see Field 05C.
W72-11718

ANALYSES OF BENTHIC COMMUNITY STRUCTURE IN A RESERVOIR BY USE OF DIVERSITY INDICES,
Kansas State Teachers Coll., Emporia.
J. D. Ransom, and T. C. Dorris.
The American Midland Naturalist, Vol 87, No 2, p 434-447, April 1972. 4 fig, 3 tab, 9 ref.

Descriptors: *Benthic fauna, *Ecological distribution, *Biological communities, Oligochaetes, Nematodes, Diptera, Caddisflies, Biomass, Standing crops, Annelids, Bays, *Oklahoma, Physicochemical properties, Depth, Density, Water analysis, Animal populations, Distribution patterns, Conductivity, Aquatic insects, Hydrogen ion concentration, Dragonflies, Mayflies, Midges, Mosquitoes, Water beetles, Dissolved oxygen.
Identifiers: *Macroinvertebrates, Species diversity, Coelenterates, Keystone Reservoir, Damselflies, Cordylophora lacustris, Dero, Limnodrilus hoffmeisteri, Caenis, Hexagenia, Octogomphus specularis, Oecetis, Psychomyia, Agraylea, Berosus striatus, Palpomyia tibialis, Chaoborus punctipennis, Calopsectra, Cryptochironomus, Dicrotendipes, Glyptotendipes nr. lobiferus, Harnischia nr. arbortiva, Polypedilum nr. halterale, Procladius poss. bellus, Pseudochironomus fulviventris, Stictochironomus, Chironomus nr. attenuatus, Chironomus plumosus.

Benthic macroinvertebrate collections and physiochemical measurements were made monthly in four bays of Keystone Reservoir, Oklahoma (November 1965 October 1966). A total of 25 benthic macroinvertebrate species were collected. Benthic community structures were subjected to species diversity analysis and the results were related to selected physicochemical estimates. An inverse correlation existed between diversity and conductivity, and between diversity and depth; however, a direct correlation existed between conductivity and depth. There was also an annual diversity difference between bays with different water quality, indicating that diversity indices were an easy and reliable method for determining long term effects of waters of different qualities on the benthic fauna within reservoirs. (Snyder-Battelle)
W72-11729

IDENTIFICATION AND LOCATION OF ACTINOMYCETES IN THE SOUTHERN END OF LAKE MICHIGAN,
Chicago Dept. of Water and Sewers, Ill. Water Purification Div.
For primary bibliographic entry see Field 05A.
W72-11731

2I. Water in Plants

FISH PRODUCTION IN TWO IDAHO STREAMS,
Idaho Dept. of Fish and Game, Kuna.
W. H. Goodnight, and T. C. Bjornn.
Trans Am Fish Soc. Vol 100, No 4, p 769-780. 1971. Illus, Map.
Identifiers: Biomass, *Fish, *Idaho, Production, Rainbow trout, Streams, *Salmon River.

Fish production (tissue elaboration) were estimated in 2 tributaries of the Salmon River in Idaho. Fish in Big Springs Creek produced 11.8 g/m2/yr and in the Lemhi River 13.6 g/m2/yr. In Big Springs Creek juvenile rainbow-steelhead trout comprised most (84-95%) of the biomass present and contributed most of the production (88%). In the Lemhi River, however, a large population of unexploited whitefish made up most (60-80%) of the biomass but they contributed only 52% of the production. The desired yield from Big Springs Creek, an intensively managed stream, was steelhead trout smolts and the weight of the juvenile migrants was 34% of total production in the stream. In the Lemhi River, chinook salmon smolts were the primary desired yield and weight of smolts was probably less than 11% of total production. Virtually no yield was obtained from the whitefish population in the Lemhi River.--Copyright 1972, Biological Abstracts, Inc.
W72-11101

THE INFLUENCE OF TEMPERATURE ON THE PROCESS OF WATER UPTAKE BY DETACHED LEAVES AND LEAF DISCS,
Glasgow Univ. (Scotland). Dept. of Botany.
J. A. Milburn, and P. E. Weatherley.
New Phytol., Vol 70, No 5, p 929-938. 1971. Illus.
Identifiers: Cells, Discs, Expansion, Fractions, Plant growth, *Leaves, Resaturation, Ricinus communis-D, *Temperature, Tissues, *Moisture uptake.

When a water deficit was induced in a mature fuory turgid leaf of Ricinus communis L. the tissues could completely regain full turgidity by absorption of water at around 1C. This was true of large water deficits (40%) which greatly exceeded the cell wall volume (12%). This uptake, therefore, included movement into the protoplasts and was not restricted to the cell walls alone as was previously thought. However, resaturation of leaf tissues taken from plants which had suffered from drought for more prolonged periods, could be separated into 2 fractions. An uptake at 1C was attributable as before to recovery of turgor; an extra uptake at 25C seemed to be a growth phenomenon inhibited at the lower temperature. This represented a rapid cell expansion following a period of growth arrestment due to water stress. The implications of these findings for the measurement of relative water content are discussed.--Copyright 1972, Biological Abstracts, Inc.
W72-11247

INFLUENCE OF MIST ON FLORAL INITIATION OF PHARBITIS NIL,
Cornell Univ., Ithaca, N.Y. Dept. of Floriculture and Ornamental Horticulture.
K. Kimura, and H. B. Tukey, Jr.
Ber Ohara Inst Landwirt Biol Okayama Univ., Vol 15, No 2, p 61-67, 1971, Illus.
Identifiers: *Flowering, Light, *Mist, Pharbitis nil D.

Plants of Pharbitis nil 'Violet' were subjected to an atomized water mist treatment before, during and following photoinduction of floral initiation. Mist treatment in the light immediately before photoinduction suppressed flowering responses; treatment during photoinduction promoted floral initiation. Flowering responses were suppressed by a 4-hr or longer mist immediately following photoinduction. On the first and second day following photoinduction, flowering responses seem to be in an unstable state which can be affected by mist. However, on the third day, floral initiation was not inhibited by the mist.--Copyright 1972, Biological Abstracts, Inc.
W72-11253

STOMATAL OPENING QUANTITATIVELY RELATED TO POTASSIUM TRANSPORT: EVIDENCE FROM ELECTRON PROBE ANALYSIS,
Michigan State Univ., East Lansing. AEC Plant Research Lab.
G. D. Humble, and K. Raschke.
Plant Physiol, Vol 48, No 4, p 447-453, 1971, Illus.
Identifiers: Cells, Electron probe analysis, Osmotic pressure, *Potassium solutes, *Stomatal, Transport, Vicia faba D, Volume.

When stomata of Vicia faba opened (from a stomatal aperture of about 2 micro m to 1 of 12 micro m) the solute content of the guard cells increased by 4.8 x 10-12 osmoles/stoma. During the same time an average of 4.0 x 10-12 gram equivalents of K+ were transported into each pair of guard cells. This amount of K+, if associated with dibasic anions, is sufficient to produce the changes in guard cell volume and osmotic pressure associated with stomatal opening. Analysis of Cl, P, and S showed that these elements were not transported in significant amounts during stomatal opening. This finding suggests that the anions balancing K+ were predominantly organic. K+ was specifically required because no other elements, likely to be present as cations, were found to accumulate in appreciable quantities in guard cells of open stomata.--Copyright 1972, Biological Abstracts, Inc.
W72-11254

POTENTIAL SOLAR RADIATION ON PLANT SHAPES,
California Univ., Los Angeles. Dept. of Geography.
W. H. Terjung, and S. S. F. Louie.
Int J Biometeor, Vol. 16, No. 1, p 25-43 1972 12 fig, 6 ref. OWRR B-100-CAL (2) + B-121-CAL (2).

Descriptors: *Latitudinal studies, *Solar radiation, Radiation, Absorption, *Energy budget, Seasonal, Plant growth, Plant physiology.
Identifiers: *Plant shapes, Reflection.

The thesis is presented that most plant-shapes, especially trees, resemble a combination of geometrical shapes which present their non-opaque bodies to incoming radiation, which is partially absorbed by the foliage. Such a hypothesis makes possible the quantification of the budget of energy of the entire plant. Findings are presented in regard to the receipt of direct and diffuse solar radiation from the sky (clear conditions), before reflection and absorption, on a variety of geometries which simulate common plant-shapes. An all-year simulation of potential insolation for such shapes was conducted for latitudes 0 deg to 90 deg. Each shape, latitude and each season exhibited its own characteristic patterns of the various energy cycles. Derived data differed materially from data applicable to horizontal surfaces. The simulated plant-shapes tended to avoid receipt of energy in the low latitudes, whereas the opposite occurred toward higher latitudes.
W72-11315

THE ESSENTIAL NATURE OF VITAMINE A IN THE DIET OF GOLDFISH (CARASSIUS AURATUS),
Pennsylvania Univ., Philadelphia. School of Veterinary Medicine.
J. H. Jones, E. B. Bullard, and A. Rodriguez.
Trans Am Fish Soc. Vol 100 No 4 p 676-681. 1971.
Identifiers: *Carassius auratus, *Fish diets, Goldfish, Pathology, *Vitamins, Nutrient requirements.

In an attempt to determine whether or not fish require dietary sources of vitamin A, commercially reared (C. auratus) were maintained in a darkened animal room in glass tanks with continuously circulating, filtered water which was constantly aerated. The fish, divided into 2 groups, were fed synthetic diets: one of which, the control diet, contained crystalline retinol acetate; the other, the experimental, was the same diet but

without the vitamin A acetate. Periodically a fish from one group or the other was sacrificed and the vitamin A of both liver and eyes determined. The carcasses were fixed in Bouin's fluid and perserved for histological study. The amount of vitamin A in the livers of the deficient fish decreased while that in the livers of the controls increased. At approximately the same time the deficient fish developed patological signs such as hemorrage into the eyes and other sites, exophthalmos, loss of scales, and anorexia followed by death. There was still considerable vitamin A in the eyes of deficient fish. None of these signs appeared in the fish on the complete diet, and the amount of vitamin A in the tissue remained high. Without exception every fish showing pathological changes also developed a severe, generalized infection. Only 1 control fish became infected and that was very slight. Similar results, but fewer in number, were obtained from preliminary experiments. These experiments demonstrate clearly that goldfish cannot synthesize vitamin A from ordinary dietary constituents. They also suggest that the vitamin deficiency increases the susceptibility of the fish to infectious agents.--Copyright 1972, Biological Abstracts, Inc.
W72-11323

SALINITY TOLERANCE OF CATFISH HYBRIDS,
Skidaway Inst. of Oceanography, Savannah, Ga.
R. R. Stickney, and B. A. Simco.
Trans Am Fish Soc. Vol 100 No 4 p 790-794. 1971. Illus.
Identifiers: *Catfishes, Commercial fish, Hybrids, *Salt tolerance.

The salinity tolerance of several hybrids of channel catfish (Ictalurus punctatus) and blue catfish (I. furcatus) are examined since commercial production of these fish in brackish water may be attempted in the future.--Copyright 1972, Biological Abstracts, Inc.
W72-11325

PROGRESS REPORT ON REESTABLISHMENT OF THE MOJAVE CHUB, GILA MOHAVENSIS (SNYDER), AN ENDANGERED SPECIES,
California State Dept. of Fish and Game, Sacramento.
J. A. St. Amant, and S. Sasaki.
Calif Fish Game. Vol 57 No 4 p 307-308. 1971.

Descriptors: *Chubs, Endangered species, Gila mohavensis, *Reestablishment, Fish establishment.

Three localities were planted with Mojave chubs as follows: Piute Springs and Two Hole Springs in San Bernardino County; and South Coast Botanic Garden Pond at Palo Verdes, California. Further suitable sites for introductions are being searched.--Copyright 1972, Biological Abstracts, Inc.
W72-11329

EFFECTS OF TEMPERATURE ON ELECTROLYTE BALANCE AND OSMOREGULATION IN THE ALEWIFE (ALOSA PSEUDOHARENGUS) IN FRESH AND SEA WATER,
Wisconsin Univ., Milwaukee. Center for Great Lakes Study.
J. G. Stanley, and J. Colby.
Trans Am Fish Soc. Vol 100, No 4, p 624-638. 1971. Illus.
Identifiers: *Alewife, Alosa pseudoharengus, Electrolyte balance, Osmo regulation, *Temperature, *Salinity.

A study of the effects of temperature and salinity on ionoregulation in A. pseudoharengus revealed that concentrations of Na, K, and Ca in plasma and muscle were similar in fish adapted to freshwater and those adapted to sea water. The nonstressed alewife is apparently an excellent ionoregulator in both environments. Acute exposure to cold caused a shift in plasma concentrations of Na and Ca toward environmental concentrations, i.e., these ions decreased in freshwater and increased in sea water. An ionoregulatory failure due to cold is suggested. High temperatures had little effect on plasma electrolyte levels in freshwater whereas in sea water the concentrations of Na, K, and Ca were elevated. Mortalities of the alewife in the Great Lakes may be caused by osmoregulatory failure induced by acute exposure to cold, but are probably not induced by exposure to elevated temperatures. Fish thermally acclimated in the laboratory or in Lake Michigan had essentially normal concentrations of blood electrolytes. In muscle, Na was reduced during exposure to acute cold in both freshwater and sea water. The effect of warm water on ion levels in muscle was, in general, opposite that of cold. These data suggest shifts of ions or water between cellular and extracellular fluids of muscle. Such shifts might affect the function of excitable tissue. Muscle tremors and loss of equilibrium observed in dying alewives during summer mortalities might be brought about when sudden temperature drops (e.g., as a result of upwellings which are common occurrences in the Great Lakes) induce disturbances in cellular or extracellular concentrations of ions. In the laboratory, alewife mortalities caused by increasing or decreasing temperatures were about equal in freshwater and sea water. These findings suggest that salinity does not modify the capacity of alewives to tolerate acute temperature stress.--Copyright 1972, Biological Abstracts, Inc.
W72-11332

REMARKS ON FRESHWATER BRYOZOA IN WESTERN NORWAY,
Bergen Univ. (Norway). Zoological Museum.
G. G. Raddum.
Fauna (Oslo). Vol. 24, No. 2, p 84-95. 1971. Illus. (Engl. summ.).
Identifiers: *Bryozoa, Calcium, Fresh-water, Ions, *Norway, Hydrogen ion concentration.

Very little is known about the freshwater moss animals in Norway and they are presumed to be rare. The 7 known species are mentioned and a list is given of localities where freshwater Bryozoa are found. The hydrogen-ion concentration (pH) and Ca++ for 12 localities are given. A key to the Norwegian species is given.--Copyright 1972, Biological Abstracts, Inc.
W72-11352

GROWTH RESPONSE OF CORN TO CHANGES IN ROOT TEMPERATURE AND SOIL WATER SUCTION MEASURED WITH AN LVDT,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 03F.
W72-11388

SPECIFIC MORPHOLOGICAL AND BIOLOGICAL FEATURES OF AQUATIC ADVENTITIOUS ROOTS IN PHRAGMITES COMMUNIS TRIN,
All-Union Research Inst. for the Paper Industry, Astrakhan (USSR).
A. P. Chuzhova, and L. Y. Arbuzova.
Bot Zh. Vol 55 (No 10): p 1473-1480 1970. Illus. English summary.
Identifiers: *Adventitious roots, Aquatic, Flooding, *Morpholish, Nutrition, Phragmites-Communis-M, *Roots.

The biological significance of the floating adventitious roots formed on the reed shoots in the aquatic medium during the period of inundation was studied in the Volga delta under different conditions of flooding. The floating adventitious roots play an essential role in the life of the reed. On the lower stem nodes they develop a dense network of branching lateral roots with a large absorbing surface and provide the plant with some additional nutrition from the aquatic medium. Both the yield of the aboveground phytomass and the quality of the raw materials obtained there depend on the duration of inundation and on the functioning of the floating adventitious roots. The data obtained may be useful in the reed cultivation.--Copyright 1972, Biological Abstracts, Inc.
W72-11398

SUCTION FORCE AND RESPIRATION RATE OF PICEA ABIES KARSTEN ROOTS IN FORESTS OF THE TAIGA ZONE,
Akademiya Nauk SSSR, Leningrad. Botanicheskii Institut.
M. A. Abrazhko.
Bot Zh. Vol 55, No 6, p 843-847. 1970.
Identifiers: Aeration, Forests, *Soil moisture, Picea abies G, Rates, *Respiration, Roots, Soils, Suction, Taiga zone, Saturated soils, Soil-water-plant relationships.

The intensity of respiration was studied in the roots of Picea abies. During periods of sufficient soil moisture the intensity of physiological processes in the roots of trees in highly productive associations was higher than in less productive swampy associations. During periods of decreased moisture the suction strength of the roots in associations with excess seasonal waterlogging of the soil and poor aeration can appear higher than in phytocoenoses growing on well-drained soils.--Copyright 1972, Biological Abstracts, Inc.
W72-11399

THE VEGETATION OF THE KEM'-LUDSK ARCHIPELAGO,
V. N. Vekhov.
Tr Kandalaksh Gos Zapovednika. 7. p 60-125. 1969.
Identifiers: *Kem'-Ludsk, Archipelago, Aspen D, Bilberry D, Birch D, Bogs, Crowberry D, *Forests, Lichen, Meadows, Moss, Pine G, Shrub, Spruce G, Tundra, USSR, Vegetation.

The archipelago is a part of the Kandalaksha Preserve and is located somewhat south of the Arctic Circle. Most of the area of the archipelago is occupied by forest. The most widespread are pine forests, constituting 68% of all the forested area; 7 types of pine forests are distinguished by moisture supply and edaphic conditions, and the most common of these is the bilberry-crowberry pine forest. Spruce forests occupy 13% of the area and are of 4 types, usually including pine and birch. The birch forests are primary, of 7 types, and often with an admixture of aspen. Aspen forests, which are found in low-lying areas, are rare and consist of 2 types. There are tundra types on most of the islands. Six types of tundra are distinguished: (a) stony Arctic tundra, found under the most extreme conditions; (b) stony lichen tundra, distributed in 6 associations on the upper parts of slopes; (c) shrub-lichen tundra, in 4 associations on steep protected slopes; (d) shrub tundra, occupying the lower parts of the slopes of southern and western exposures on which conditions are favorable for the accumulation of snow (2 associations); (e) moss-lichen tundra, found in the same habitats but with more abundant moisture (3 associations); (f) moss tundra on the southern slopes (2 associations). Bogs occupy 6% of the area; commest are upland and trasitional types, while the lowland types are very rare. Meadows, which occupy less than 1% of the area, are of 5 types of which the commonest is the seaside type. Vegetation is of the shore and cliff type. Characterizations are given of the vegetation of each of the islands of the archipelago and profiles are given of the most important ones.--Copyright 1972, Biological Abstracts, Inc.
W72-11400

VEGETATION OF THE BOGS OF THE OKA--ZIMA INTERFLUVE IN IRKUTSK OBLAST,
I. G. Lyakhova.
Izv Biol-Geogr Nauch-Issled Inst Irkutsk Univ. Vol 23 No 3 p 135-149. 1969.

Identifiers: *Bogs, *Irkutsk oblast, Oka-Zima interfluve, Peat, Sedges M, Shrubs, Sphagnum magellanicum, Sphagnum wulfianum, USSR, *Vegetation.

Six types of vegetation were distinguished according to the life forms of the plant edificators. Societies of the herbaceous type predominate, with dominance by tufted and other sedges. Herbaceous-hydrophilic-mossy eutrophic societies are also widespread. Less frequent are woody-hydrophilic-mossy societies. An interesting finding was flatmounded bogs in spurs of the eastern Sayan mountains with mounds 1 to 4 m in diameter which were coverdd with Sphagnum magellanicum, S. wulfianum, and shrubs. Two peat-bog areas were distinguished in the region examined: the foothill type with the bogs dominated by a considerable layer of peat (up to 3 m thick) with pronounced moss cover, and valley-type with bogs covered with low herbage associated with fallow land.--Copyright 1972, Biological Abstracts, Inc.
W72-11403

USE OF ECOLOGICAL PROFILE FOR THE INVESTIGATION OF SPATIAL DISTRIBUTION OF VEGETATION,
Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Biology.
G. S. Sabardina, and E. B. Vielichko.
Izv Akad Nauk Latv SSR. 5 p 12-19. 1970. Illus. English summary.
Identifiers: *Distribution, Ecology, Profiles, Soils, *Vegetation.

The character of a parcel natural swamp vegetation was not determined by any single ecological factor. Hydrological and edaphic conditions were improtant.--Copyright 1972, Biological Abstract, Inc.
W72-11405

THE ORIGIN AND DISTRIBUTION OF VALLEY GRASSLANDS IN EAST AFRICA,
For primary bibliographic entry see Field 04A.
W72-11408

EFFECT OF MOISTURE DEPLETION IN SEEDLINGS OF THREE PANICUM GRASSES DURING GERMINATION,
Jodhpur Univ. (India). Dept. of Botany.
A. Mukherjee, and U. N. Chatterji.
Bull Bot Soc Bengal. Vol 23, No 2, p 143-148. 1969. Illus.
Identifiers: *Moisture stress, Depletion, *Germination, Grasses M, Moisture, Panicum, Panicum antiodotale M, Panicum coloratum M, Panicum turgidum M, Seedlings, Temperature.

One day old seedlings of Panicum antidotale, P. coloratum and P. turgidum were subjected to moisture stress at different temperatures ranging from 5C to 50C and for 3 durations (1 1/2 to 4 1/2 gr). The seedlings were then placed in moist conditions for revival. In another set of experiments, the moisture loss due to desiccation was noted. The depletion of moisture was gradual and indicated a regular trend; except in P. antidotale where maximum loss was observed in 45C for 1 1/2 hr duration. There was comparatively less loss of moisture in P. turgidum. The temperature and duration interaction played a major role in determining the revival of growth. All species of Panicum studied could tolerate desiccation of the germinated seedlings up to 21% in high temperatures (30C to 45C). But at a low temperature (20C) 7-12% moisture loss from the seedlings might be detrimental to their revival for growth. P. turgidum was comparatively more tolerant to desiccation treatments.--Copyright 1972, Biological Abstracts, Inc.
W72-11414

DESICCATION-TOLERANT FLOWERING PLANTS IN SOUTHERN AFRICA,
Monash Univ., Clayton. (Australia). Dept. of Botany.
D. F. Gaff.
Science, Vol 174, No 4013, p 1033-1034. 1971.
Identifiers: *Drought tolerance, Africa, Desiccation, Flowering, Leaves, *Plants, Resistance.

The S. African flora contains a unique abundance of higher plants which withstand virtualty complete desiccation. Water potentials of field-dry leaves corresponded to 30-40% relative humidity. Mature leaves survived from 15 to approximately 0% relative humidity. Known examples were increased from 4-15 spp., which for the first time included grasses.--Copyright 1972, Biological Abstracts, Inc.
W72-11424

THE PRODUCTIVITY, STORED WATER, AND MINERALS IN SOME ASSOCIATIONS OF THE SOUTHERN TAIGA OF BOL'SHOI USHKAN' I ISLAND,
I. N. Beideman, P. K. Gagarin, and V. N. Pautova.
Tr Limnol Inst Sib Otd Akad Nauk SSSR. Vol 17, No 37: 3. 173-227. 1969.
Identifiers: Bilberry-D, Cycling, Islands, Larch-G, *Minerals, Nutrient, Pine-G, Productivity, Rhododendron-D, *Stored water, *Taiga, Transpiration, Ushkan, USSR, *Plants.

Studies were made of 3 associations: larch groves with mixed herbs, larch groves with mixed herbs and rhododendron, and pine-bilberry-mixed herbs-rhododendron. Determinations were made of the population sizes of the species/ha, stocks of the biomass, water, and minerals, and transpiration. All the variables are given for different stories of the plant association: woody,shrubby, and herbaceous. The amount of fresh matter in the association varied from 165 to 450 metric tons/ha, that of dry matter from 87 to 210. The amount of water stored in the plants of the association varied from 78 to 240 metric tons/ha and the amount of water in transpiration from 1441 to 2536 m3/ha. Ash varied from 0.43 to 0.77 metric tons/ha. Determinations were made of N, Ca, K, Mg, P, Al, Si, Fe, S, and Na. The ratio of the mineral content of the elements in the plants of each species is given. In each biogeocoenosis there is a rhythm of water and mineral exchange between the plant association, the soil, the atmosphere, and the bedrock. The most stable concentrations of elements are in the trees and bedrock. Those in the leaves, roots, and herbage of the association are the most labile. Those in the bedrock, on the one hand, and in the trunks and branches on the other, interact only periodically. The atmosphere interacts principally with the elements in the leaves, roots, and herbage, and with the soil.--Copyright 1972, Biological Abstracts, Inc.
W72-11431

ROLE OF ARTIFICIAL KNICKPOINTS FOR REPRODUCTION OF FORAGE AND TROUT RESERVES IN MOUNTAIN STREAMS OF THE UKRAINIAN CARPATHIANS,
Chernovtsy State Univ. (USSR).
I. D. Shnarevich, and Z. S. Starik.
Gidrobiol Zh, Vol 7, No 2, p 82-89, 1971, Illus, English summary.
Identifiers: Carpathians mountains, Forage, *Knickpoints, Reproduction, Reserves, Streams, *Trout, *Ukrainian, USSR.

Artificial knickpoints in mountain streams of the Ukrainian Carpathians are a rational and effective method of favoring the natural reproduction of Salmonoidei; the O2 conditions of water courses improve, the quantity and biomass of benthic population increase by 24.6% and 11.9-13.6%, respectively. Location and design of the knickpoints should correspond to the hydrological flow of mountain rivers.--Copyright 1972, Biological Abstracts, Inc.
W72-11562

STUDIES ON THE MOSQUITOES OF NORTH ARCOT DISTRICT, MADRAS STATE, INDIA: V. BREEDING PLACES OF THE CULEX VISHNUI GROUP OF SPECIES,
World Health Organization, New Delhi (India).
R. Reuben.
J Med Entomol. Vol 8, No 4, p 363-366. 1971. Illus.
Identifiers: Arcto, *Breeding, Culex-Pseudovishnui, Culex-Tritaeniorhynchus, Culex-Vishnui, *India, Madras, *Mosquitoes, Rice-M, Species.

Culex vishnui larvae were most common in fallow rice fields, C. pseudovishnui and C. tritaeniorhynchus larvae in planted rice fields. Large numbers of C. tritaeniorhynchus were also found in wells, ponds and ditches. In plow, flooded fallow fields and in fields with young paddy, C. vishnui larvae were dominant. By the time the paddy reached about .3 m (1 ft) high, C. pseudovishnui and C. tritaeniorhynchus began to replace C. vishnui. No statistically significant differences could be demonstrated between numbers of larvae from the edges of fields and from the interiors, but individual fields showed larvae to be concentrated in the area of the field furthest from water inlets.--Copyright 1972, Biological Abstracts, Inc.
W72-11577

SEASONAL DIAMETER INCREMENT OF OAK TRUNKS UNDER THE CONDITIONS IN THE VOLGA AREA NEAR GORKI,
K. K. Poluyakhtov, and L. V. Bobyleva.
Uch Zap Gor'K Univ. 84. 255-262. 1968.
Identifiers: Gorki, Humidity, *Oak-D, Precipitation, Quercus-Robur-D, Seasonal, Temperature, USSR, *Volga, *Tree trunks.

The seasonal course of growth in diameter of 3 Quercus robur trees (35, 50 and 100 yr old) was studied. Wood samples were taken during the day between 11 a.m. and 3 p.m. every 12-15 days. Air and soil temperature, precipitation and air humidity were measured. The increment begins in the middle of May when the mean daily air temperature is over 10 deg C, and the temperature at the ground surface is 15-20 deg C, coinciding with the onset of leaf bud opening; it ends at the end of Sept. or the beginning of Oct. when air temperature and soil temperature are below 10 deg C. Growth is maximum during the end of May-beginning of July, stops briefly in June-July, and rapidly increases during the end of July-beginning of Aug. The increment of the southern and western sides of the trunks is higher than on the northern and western sides. No clear relation was discovered between increment and weather conditions.--Copyright 1972, Biological Abstracts, Inc.
W72-11596

PLANTATIONS OF CERTAIN VALUABLE TREE SPECIES UNDER THE VARIOUS FOREST GROWING CONDITIONS OF THE SHEKI-ZAKATALY ZONE,
M. Y. Khalilov.
Tr Azerb Nauchno-Issled Inst Lesn Khoz Agrolesomelior. 8: 167-174. 1968.
Identifiers: *Castanea-Sativa-D, Diospyros-D, Forest, Growth, Juglans-Regia-D, Oak-D, Pine-G, Plantations, Slopes, Soils, Species, *Trees, USSR, *Sheki-Zakataly zone.

Castanea stiva sativa is suitable for planting on deep, shallow and highly skeletal soils, on slopes of all exposures of steepness up to 20-25 deg C at an altitude of 600-1200 m. Plantations of Juglans regia should be located on rich, moist, soils (river terraces, narrow valleys, ravines, and gentle northern slopes). Combinations of J. regia with C. sativa or with Diospyros are possible on rich soil under moist growing conditions. On steep slopes (over 20-25 deg), pine, oak and shrubs should be utilized.--Copyright 1972, Biological Abstracts, Inc.
W72-11625

INFLUENCE OF CL- ON CHLOROPHYLL CONTENT IN THE LEAVES OF CHENOPODIUM ALBUM L,
Univerzita Pavla Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Natural Science.
S. Kocurik, and A. Vojtun.
Biologia (Bratislava). Vol 26, No 1, p 77-80. 1971. Illus. English summary.
Identifiers: Biosynthesis, *Chenopodium-Album-D, Chenopodium-Strictum-D, Chloride, *Chlorine, *Chlorophyll, C, Ions, Leaves, Soils.

After analyzing leaves of C. album and C. strictum Roth, which grow in the vicinity of a small salt lake on soil with high Cl- contents, the Cl- content in dry leaf matter was directly proportional to Cl-concentration in the soil. The total chlorophyll content in dry leaf matter decreases as the Cl- concentration rises. On the basis of analysis, high Cl-concentrations have an adverse effect on chlorophyll biosynthesis.--Copyright 1972, Biological Abstracts, Inc.
W72-11684

WATER AND SOIL CONDITIONS IN THE DEVASTATED LOW MOOR-LAND,
Wyzsza Szkola Rolnicza, Lubin (Poland).
J. Borowiec.
Ann Univ Mariae Curie Sklodowska Sect E Agric. 24: p 105-123. 1969. Map. English summary.
Identifiers: Fertility, Grass-M, *Low moor-land, Muck, *Peat, Sedge-M, *Soils.

Due to excessive lowering of the ground-water level (80-130 cm) and of changes in the surface of moor-land caused by exploitation for peat, the water relations for the growth of meadow plants were very unfavorable. Under such conditions, the accelerated mineralization of peat mass brought the surface horizon soil (peat) to destruction and pulverization. The soils are characterized by little differentiated, strongly degraded muck soils formed of lowland peat (mainly of sedge peat). Physical and water properties of these soils are of unfavorable character and are dependent upon the method of soil utilization and the distance from post-peat pits. The growth of grasses is very poor.--Copyright 1972, Biological Abstracts, Inc.
W72-11687

THE DYNAMICS OF THE VEGETATION OF THE SOLONETZ-SOLONCHAK COMPLEX OF THE NORTHERN FOREST-STEPPE OF OMSK OBLAST AS RELATED TO CHANGES IN SOIL SALT AND MOISTURE CONTENT,
E. P. Pozdnyakova.
Uch Zap Omsk Gos Pedagog Inst. 51. 91-103. 1970.
Identifiers: Climate, Forests, Moisture, *Omsk Oblast, Soils, *Solonchak-Solonetz, Steppes, USSR, Vegetation, *Saline soils.

Observations were made for 3 yr at a station in the Lake Achikul' depression. An outline profile is given for the ecological series of the complex. The meteorological conditions of the year, changing salt content and soil moisture, influence the vegetation. The degree of this influence is different in different associations because of the water and salt conditions in the soil types. Tables are given of the change in salinity of the 0-20 cm soil horizon and of the change in soil moisture of the upper horizons of the soil under the associations of the ecological series. The soil complex by the lake changed the most during the years of observation. Tables are given of the Jacquard coefficients of floristic community and of the Y. Zlobin coefficients of similarity of phytocoenoses among the component associations; tables are also given for the comparative characterization of the vegetation of some associations of the ecological series of the complex in 1966 and 1967. When selection is made of plant soil-salinity indicators for similar complexes, consideration must be given to the meteorological conditions of the year. For some soil varieties separate indicators must be selected for dry and wet years.--Copyright 1972, Biological Abstracts, Inc.
W72-11716

ON THE MORPHOLOGY AND NATURE OF A LEECH OF THE GENUS PHILOBDELLA (HIRUDINOIDEA: MACROBDELLIDAE),
L. R. Richardson.
The American Midland Naturalist, Vol. 87, No. 2, p 423-433, April 1972. 6 fig, 24 ref.

Descriptors: *Systematics, Aquatic animals, *South Carolina, Invertebrates, Annelids, Worms.
Identifiers: *Leeches, *Philobdella gracile, Morphology, *Turkey Creek (S.C.).

The morphology of the pharnyx and associated structures, and the morphology and morphological relationships of organs on the anterior region of the paired male ducts have aided in the classification of two leeches collected from Turkey Creek, South Carolina, into the genus Philobdella (Hirudinoidea: Macrobdellidae). Distinguishing characteristics include the absence of a male median region, no female atrium or common oviduct, and a caecate vagina occupying the entire female median region. (Synder-Battelle)
W72-11733

2J. Erosion and Sedimentation

VARIATION OF BED FORM AND FLOW RESISTANCE IN ALLUVIAL CHANNELS,
Illinois University, Urbana. Dept. of Civil Engineering.
B. C. Yen.
In: Proceedings of 14th Congress, International Association for Hydraulic Research, Paris, France, 1971, Vol 3, p 83-90, 1971. 2 fig, 20 ref. OWRR A-033-ILL (2) agreement no.

Descriptors: *Channel morphology, *Alluvial channels, *Particle size, *Froude number, *Settling velocity, Sediment transport, Scour, Sedimentary structures, Roughness (Hydraulic), Bed load, Discharge (Water).

The bed form and the hydraulic resistance of alluvial channels are functions of the Froude number, Reynolds number, ratio of width to depth, channel shape, ratio of sediment size to hydraulic radius, standard deviation of sediment particles, and ratio of sediment fall velocity to shear velocity. Hence, any change in flow, channel, or sediment characteristics which would vary the magnitude of any one or more of these dimensionless parameters would cause changes in the bed form and flow resistance. For sediment-laden flow with a large ratio of width to depth and relatively uniform particles, analysis of flume data indicates that as a first approximation the bed form is simply a function of the Froude number and the ratio of sediment size to hydraulic radius. By using this simple relationship, variations of bed form due to changes in channel slope, cross section, discharge, or sediment size can be found. (Knapp-USGS)
W72-11285

SIMULATION TECHNIQUE FOR SUSPENDED AND BED LOAD FOR SILT EJECTOR,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 08A.
W72-11356

AN INVESTIGATION OF RIVER BED DEGRADATION DOWNSTREAM OF A DAM,
Kyoto Univ. (Japan).
K. Ashida, and M. Michiue.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol. 3, Paris, France, p. 247-255, Aug-Sept 1971. 9 fig, 1 tab, 4 ref.

Descriptors: *Degradation (Stream), *River beds, *Bed load, *Sediment transport, *Sedimentation, Erosion, *Stream erosion, Gradation, Flow rates, Sediments, Grain sizes, Distribution patterns.
Identifiers: Japan, Bed load movement, Critical tractive force.

The results are given of an investigation concerning the degradation of a riverbed composed of graded material downstream of a dam. The investigation was based on the mechanics of bedload transportation for nonuniform sediment. The effect of nonuniformity of the material on the bedload transportation can be expressed by the difference of the threshold condition of movement for each grain size. Riverbed degradation can be treated by using a representative diameter for the sediment mixture when the material of every grain size is in the moving state. When some parts of the bed material are under the threshold condition of movement, an armor coat is formed. A method is proposed to predict the grain size frequency distribution of the armor coat and to estimate the amount of riverbed degradation based on an analytical model. (USBR)
W72-11361

TURBIDITY MEASUREMENT,
Florida State Game Freshwater Fish Commission, Eustis.
R. M. Dughrow, and W. H. Everhart.
Trans Am Fish Soc. Vol 100, No 4, p 682-690. 1971. Illus. Map.
Identifiers: *Suspended solids, *Measurement, Streams, *Turbidity, Water properties, Water measurement, Analytical techniques.

A quick and reliable method of measurement is necessary to set standard limits on the amount of suspended sediment to be tolerated in streams near land-use operations. Turbidity measurements may be useful if a major portion of the total turbidity is contributed by settleable solids, if a relationship exists between turbidity readings and weight per unit of volume of suspended sediment, and if a reliable meter is available. Water with turbidity readings greater than one JTU (Jackson Turbidity Unit) is generally composed mostly of settleable solids unless distorted by color. Non-filterable and total dissolved solids contribute variable amounts of light penetration reduction. Percentage contribution to turbidity of settleable solids is highly variable from sample to sample and from station to station. A high correlation exists between turbidity readings and weight for individual sediment types of suspension, but a poor relationship exists when sediment type is varied. Experiments conducted on the Hach model 2100, the Hellige, and the Jackson Candle turbidimeters resulted in a highly significant difference (alpha = 0.01) between readings on the same sample of suspended sediment. Turbidity is a questionable measure of suspended solids in water. A more accurate index would be suspended solids measured gravimetrically.--Copyright 1972, Biological Abstracts, Inc.
W72-11432

POSTGLACIAL LAHARS FROM MOUNT RAINIER VOLCANO, WASHINGTON,
Geological Survey, Washington, D.C.
D. R. Crandell.
Available from GPO, Washington, D.C. 20402, Price $2.00. Geological Survey, Washington Professional Paper 677, 1971. 75 p, 37 fig, 3 plate, 12 tab, 71 ref.

Descriptors: *Sedimentation, *Mudflows, *Volcanoes, *Washington, Landslides, Sediment transport, Debris avalanches, Avalanches, Floods.
Identifiers: *Lahars, *Mt. Rainier.

More than 55 lahars (mudflows and debris flows from a volcano) originated at Mount Rainier during Holocene time. These ranged in length from a few miles to 70 miles and in volume from a few million cubic yards to more than half a cubic mile. Many lahars have been triggered either by strong earthquakes or by volcanic explosions, or possibly by swelling that accompanied the ascent of molten rock into the volcano. Other lahars were created by the eruption of hot volcanic bombs, dense rock

fragments, and ash onto ice and snow at the summit of the volcano. Rapid melting of snow created floods down the volcano's flanks which carried down rock debris and also picked up loose detritus on valley floors to form lahars. Still other lahars resulted from precipitation of cloudburst proportions and by glacier outburst floods. Some outburst floods may have been caused by excessive melting of ice around subglacial steam vents. If future eruptions of Mount Rainier were to be similar in scale and type to those of the last 10,000 years, the greatest hazard would be that of lahars. Because of the restriction of lahars to the lower parts of valleys away from the immediate flanks of the volcano, valley floors would be especially hazardous. In view of the increased probability of lahar formation during an eruption, valley floors should be evacuated immediately within a radius of at least 25 miles from the volcano if an eruption should begin. (Knapp-USGS)
W72-11473

EFFECTS OF VOLCANIC ASHFALLS ON CHEMICAL AND SEDIMENT CHARACTERISTICS OF TWO ALASKAN LAKES,
Alaska Univ., College, Inst. of Marine Science; and Washington Univ., Seattle, Dept. of Oceanography.
For primary bibliographic entry see Field 02H.
W72-11569

FIELD OBSERVATIONS OF SAND TRANSPORT BY SHOALING WAVES,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
D. O. Cook, and D. S. Gorsline.
Marine Geology, Vol 13, No 1, p 31-55, June 1972. 16 fig, 1 tab, 38 ref. NOOO14-67-A-0269-0002.

Descriptors: *Sediment transport, *Beaches, *Littoral drift, *Waves (Water), *Surf, Rip currents, Coasts, Ripple marks, Ocean waves, California, Particle size, Sands.

Wave-generated currents and associated sand transport were studied in the offshore zone of southern California. A set of passing waves generates oscillating currents at the sea floor which have a spectrum of velocities whose average strengths over broad shelves are predicted accurately by classical wave theory. Long period swells and offshore breezes cause a net transport of bottom water towards the beach, while short period waves and onshore winds are associated with neutral or seaward flow. Ripple marks on the shallow sea floor, whose dimensions are a function of sediment size and current velocity, allow all available sand sizes to be moved with equal ease. A ripple remains in the same position even though sediment and water may be differentially transported. Most bottom sand transport occurs in the lowest few centimeters of the water column at a rate which varies with the square of current strength. Fine sand-grain size populations migrate in the direction of the greatest current velocities as a unit without being sorted. During winter in southern California, rip currents transport beach sand to the offshore where it is confined by predominant seaward oscillations caused by steep waves and strong winds. Rips are not active in calm summer months, and long period swells produce shoreward surge asymmetry which replenishes the beach with sediment. (Knapp-USGS)
W72-11662

VOLUMETRIC COMPONENT ANALYSIS OF UNCONSOLIDATED SEDIMENTS USING SLIT SIEVES,
Bristol Univ. (England). Dept. of Geology.
R. D. Channon, and A. T. Buller.
Marine Geology, Vol 13, No 1, p M7-M13, June 1972. 1 fig, 4 tab, 10 ref.

Descriptors: *Sieve analysis, *Particle size, *Particle shape, *Sieves, *Screens, Sedimentology, Sediments, Equipment.
Identifiers: *Slit sieves.

Slit sieves differ from conventional sieves because the apertures are elongate rather than square. Slit sieves size unconsolidated sediments according to maximum grain thicknesses. Conventional point-count procedures used in conjunction with grain thicknesses enable percentage volumes of sediment components to be determined. (Knapp-USGS)
W72-11664

SEDIMENTARY DYNAMICS UNDER TIDAL INFLUENCES, BIG GRASS ISLAND, TAYLOR COUNTY, FLORIDA,
Florida State Univ. Tallahassee. Dept. of Geology and Oceanography.
F. D. Walton, and H. G. Goodell.
Marine Geology, Vol 13, No 1, p 1-29, June 1972. 17 fig, 5 tab, 38 ref.

Descriptors: *Erosion, *Sediment transport, *Tides, *Sand bars, *Florida, Currents (Water), Ocean currents, Littoral drift, Coastal marshes, Tidal marshes.
Identifiers: Taylor County (Fla).

Tidal currents augmented by a general rise in sea level of about 0.5 ft since 1910 have reworked and redistributed relict Pleistocene and Holocene sediments in the low-wave energy environment around Big Grass Island, Florida. Alterations in the textural parameters of sediments from the storm berm, and tidal channels, deltas and flats are a result of local hydraulic energy regimes. The position of inflection points on cumulative grain-size distributions from all of the environments represents winnowing at specific levels of wave and current power. Forced tidal flow concentrated by barrier has initiated channel erosion, sediment transport and tidal delta deposition. Better channels facilitate more effective current concentrations, and enhance erosion. Flood-current velocities are controlled by tidal range, amount of tidal-flat exposure during the previous low tide, and equalization of head differential. Highest flood velocities occur at the beginning of the cycle. Tidal range and depth of minimum low water control the velocities of the tidal ebb currents. Highest ebb velocities occur in the latter part of each cycle. Tidal erosion is greatest when mean seasonal sea level is lowest. (Knapp-USGS)
W72-11665

ORIENTATION AND GROWTH FORM OF SEA FANS,
Hawaii Univ. Honolulu. Inst. of Marine Biology.
R. W. Grigg.
Limnology and Oceanography, Vol 17, No 2, p 185-192, March 1972. 4 fig, 2 tab, 18 ref.

Descriptors: *Coral, *Currents (Water), *Sedimentary structures, Paleohydrology, Sedimentology, Stratigraphy, Sedimentation, Benthic fauna.
Identifiers: Sea fans (Coral).

Comparison of field measurements of the orientation of branching planes of several species of sea fans with the magnitude and direction of currents indicates that fan-shaped gorgonians orient at right angles to dominant current flow and may be useful as indicators of the average direction of water motion. The mechanism by which orientation is achieved may be related to mechanical forces associated with water movement. Fans were transplanted to various flow regimes and subsequently studied for signs of damage and reorientation. Differences in branchlet diameter and spicule length in Muricea appear to be associated with water motion, in ways that may represent structural adaptations enabling the organisms to withstand large forces caused by waves in shallow water. (Knapp-USGS)
W72-11667

TECHNIQUES FOR ASSESSING WATER RESOURCE POTENTIALS IN THE DEVELOPING COUNTRIES WITH EMPHASIS ON STREAMFLOW, EROSION AND SEDIMENT TRANSPORT, WATER MOVEMENT IN UNSATURATED SOILS, GROUND WATER, AND REMOTE SENSING IN HY DROLOGIC APPLICATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11672

NATIONAL SHORELINE STUDY--TEXAS COAST SHORES REGIONAL INVENTORY REPORT.
Army Engineer District, Galveston, Tex.

Available from NTIS, Springfield, Va 22151 as AD-730 691, Price: $3.00 paper copy; 95 cents microfiche. Army Corps of Engineers National Shoreline Study, 1971. 44 p, 7 plate, 28 photo, 4 tab.

Descriptors: *Beach erosion, *Shore protection, *Gulf of Mexico, *Estuaries, *Texas, Coasts, Reviews, Ocean waves, Beaches, Tidal effects, Hurricanes, Winds, Littoral drift, Currents (Water), Sands, Dunes, Breakwaters, Engineering structures, Costs, Deposition (Sediments).
Identifiers: Beach erosion inventory.

A general inventory is presented of shoreline erosion on the Gulf, bays and estuaries of the Texas coast, with possible remedial measures and approximate costs. Shore use, ownership, and other information pertinent to an overall appraisal of erosion problems are discussed. More than 200 persons were interviewed to obtain data pertinent to the study. Those interviewed were Federal, state, county, and city officials and private land owners. The shorelines were divided into three general types according to physical characteristics: Gulf shore beaches, comprising mostly fine sand, shell and shell fragments, which slope gently upward from the water to the sand dunes with heights ranging from 5 to 40 feet; coastal bay marshes of alluvial sand, clay and silt subject to frequent inundation by tides higher than normal; and bluffs, ranging from a few feet to more than 40 feet in height, which are a result of erosion from waves generated by prevailing winds. (Woodard-USGS)
W72-11674

RANDOM-WALK MODEL OF STREAM NETWORK DEVELOPMENT,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
J. S. Smart, and V. L. Moruzzi.
IBM Research Report RC 3108, October 14, 1970. 19 p, 5 fig, 4 tab, 16 ref.

Descriptors: *Simulation analysis, *Drainage patterns (Geologic), *Mathematical models, *Statistical models, Stochastic process, Networks, Computer models.
Identifiers: *Random walk models.

A random-walk, headward-growth model describes stream network development in a region of uniform lithology and uniform slope. The principal difference from previous models is that the probability of growth is dependent on the area contributing runoff to the stream tip. Two versions of the model were studied in detail and shown to give satisfactory results. A major advantage is that all of the important network variables, including drainage density and outlet density, come naturally out of the simulation processes. (Knapp-USGS)
W72-11676

THE DISTRIBUTION OF CO, CR, CU, FE, MN, NI AND ZN IN FRAMVAREN, A NORWEGIAN ANOXIC FJORD,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02K.
W72-11680

2K. Chemical Processes

FORMATION AND DISTRIBUTION OF MAGNESIUM BICARBONATE WATERS IN MESOZOIC BASINS OF EASTERN TRANSBAYKAL (NEKOTORYYE VOPROSY RASPROSTRANENIYA I FORMIROVANIYA GIDROKARBONATNYKH MAGNIYEVYKH VOD V MEZOZOYSKIKH VPADINAKH VOSTOCHNOGO ZABAYKAL'Y A),
Irkutskii Gosudarstvennyi Universitet (USSR).
T. N. Yas'ko, and V. G. Yas'ko.
Geokhimiya, No 7, p 866-872, July 1971. 2 fig, 2 tab.

Descriptors: Water chemistry, *Carbonates, *Bicarbonates, *Magnesium, *Sedimentary basins (Geologic), Aquifers, Groundwater, Wells, Springs, Streams, Permafrost, Ice, Freezing, Melting, Salinity, *Mesozoic era.
Identifers:USSR, *Transbaykal, *Chita Oblast, Mineralization, Aureoles.

Local distribution of magnesium bicarbonate waters in the Olovskaya, Zyul'zinskaya, Arbagar, Shilka, and Unda-Dainskaya Mesozoic sedimentary basins in south Chita Oblast shows no clear lithologic association, but is related to areas of permafrost. Experimental freezing and gradual melting of 2 liters of Na-Ca-Mg bicarbonate waters with a mineralization of 300 mg/liter reveal that magnesium bicarbonates are the first salts released into solution. Initial melting of ice at near-zero temperatures increases the salinity of water in aquifers. (Josefson-USGS)
W72-11117

MODES OF OCCURRENCE OF LEAD AND ZINC IN CHELEKEN THERMAL BRINES (O FORMAKH NAKHOZHDENIYA SVINTSA I TSINKA V TERMAL'NYKH RASSOLAKH CHELEKENA),
Akademiya Nauk SSSR, Moscow. Institut Geologii Rudnykh Mestorozhdenii Petrografii, Mineralogii i Geokhimii.
L. M. Lebedev, N. N. Baranova, and I. B. Nikitina.
Geokhimiya, No 7, p 823-829, July 1971. 1 fig, 2 tab, 20 ref.

Descriptors: *Geochemistry, *Brines, *Lead, *Zinc, Ion exchange, Ions, Anions, Cations, Resins, Inorganic compounds, Chlorides, Carbonates, Sorption, Adsorption, Drill holes, Aquifers.
Identifiers: USSR, *Turkmen SSR, *Cheleken Peninsula, Ore deposits, Desorption.

Modes of migration of lead and zinc in hot brines of the Cheleken ore deposit off the west coast of the Turkmen SSR are investigated. On the basis of ion exchange, most of the lead and zinc in brines occurs as chloride complexes in the form of PbC13, PbC14, and ZnC13. Variation in desorption of lead from anion resins for samples from mouths of drill holes and aquifers in sandy-clay Neogene red deposits suggests the presence of carbonate-chloride Pb complexes in deep-seated brines. (Josefson-USGS)
W72-11118

ISOTOPIC COMPOSITION OF SULFATES IN NATURAL WATERS FROM SULFIDE DEPOSITS IN THE MIDDLE URALS (O VOZMOZHNOSTI ISPOL'ZOVANIYA IZOTOPNOGO SOSTAVA SUL'FATNOY SERY PRIRODNYKH VOD V KACHESTVE POISKOVOGO PRIZNAKA KOLCHEDANNOGO ORUDENENIYA NA SR EDNEM URALE),
Uralskoe Geologicheskoe Upravlenie, Sverdlovsk (USSR).
A. I. Gavrishin, and A. L. Rabinovich.
Geokhimiya, No 7, p 873-875, July 1971. 1 tab, 3 ref.

Descriptors: *Water chemistry, *Water analysis, *Isotope studies, *Sulfates, *Sulfides, Pyrite, Sulfur, Water types, Meteoric water, Groundwater, Mine water, Exploration.
Identifiers: USSR, *Ural Mountains, Hydrogeochemistry, Aureoles, Dispersion halos, Ores.

Hydrochemical prospecting is becoming increasingly important in searching for sulfide deposits, but complex and ambiguous interpretations of hydrochemical anomalies reduce the effectiveness of techniques. The purpose of investigations in the Middle Urals in 1968 was to find a reliable means of recognizing the character of sulfate anomalies by examining the sulfur isotopic composition of different types of natural waters. The values of S-34 in sulfates of meteoric water and groundwater were +5.4% and +6.3%, respectively. In mine waters of the Lomovskoye and Levikha pyrite deposits, the average value of S-34 was +1.65% or 4 times lower than its background value. Low values of S-34 in sulfates of natural waters of the Middle Urals can be used as a hydrogeochemical indicator of the presence of sulfide ores. (Josefson-USGS)
W72-11119

STOMATAL OPENING QUANTITATIVELY RELATED TO POTASSIUM TRANSPORT: EVIDENCE FROM ELECTRON PROBE ANALYSIS,
Michigan State Univ., East Lansing. AEC Plant Research Lab.
For primary bibliographic entry see Field 02I.
W72-11254

WATER WELL AND GROUND-WATER CHEMICAL ANALYSIS DATA, SUTTON COUNTY, TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 04B.
W72-11290

THE VAPOR PRESSURE ISOTOPE EFFECT IN AQUEOUS SYSTEMS. I. H2O-D2O (-64 TO 100 DEG) AND H216O-H218O (-17 TO 16 DEG); ICE AND LIQUID. II. ALKALI METAL CHLORIDE SOLUTION IN H2O AND D2O (-5 TO 100 DEG),
Tennessee Univ., Knoxville. Dept. of Chemistry.
For primary bibliographic entry see Field 01B.
W72-11310

DEEP THERMAL STREAM IN THE DAGESTAN TERRITORY,
Scientific Council for Geothermal Studies, Moscow (USSR).
For primary bibliographic entry see Field 02F.
W72-11444

GEOHYDROLOGY OF JEFFERSON COUNTY, NORTHEASTERN KANSAS,
Kansas State Geological Survey, Lawrence.
For primary bibliographic entry see Field 04B.
W72-11464

ELECTRICAL PROPERTIES OF ICE--ANNUAL REPORT FOR THE PERIOD NOVEMBER 1970 TO OCTOBER 1971,
New Mexico Inst. of Mining and Technology, Socorro.
For primary bibliographic entry see Field 02C.
W72-11471

SPECIFIC ACTIVATION ANALYSIS TECHNIQUES AND METHODS FOR THE ASSAY OF TRACE SUBSTANCES IN AQUATIC AND TERRESTRIAL ENVIRONMENTS,
Missouri Univ., Columbia. Dept. of Nuclear Engineering and Radiological Sciences.
For primary bibliographic entry see Field 05A.
W72-11612

COPPER, MANGANESE AND ZINC CONCENTRATIONS IN GULF OF MEXICO WATERS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 05A.
W72-11656

EFFECTS OF VOLCANISM ON WATER CHEMISTRY, DECEPTION ISLAND, ANTARCTICA,
Leeds Univ. (England). Dept. of Earth Sciences.
H. Elderfield.
Marine Geology, Vol 13, No 1, p M1-M6, June 1972. 1 fig, 2 tab, 19 ref.

Descriptors: *Water chemistry, *Sea water, *Volcanoes, Silica, Manganese, Trace elements, Magmatic water, *Antarctic.
Identifiers: *Deception Island.

Waters from crater lakes on Deception Island and from coastal sea waters were collected and analyzed during a period of intense fumarolic activity and modified sea waters. The coastal seawater samples have salinities and major element levels typical of normal sea water in near-shore regions, and are only slightly modified as a result of marine weathering and runoff from melting of glaciers on the island. Samples from enclosed craters have salinities over 35%, but otherwise have major ion concentrations at normal levels. There is no evidence in any sample of fluoride enrichment. Concentrations of Al, Cu, Pb, Co, Ni and Zn showed no significant enrichment compared to averages for freshwater and seawater. Silicon and manganese, however, showed considerable variation from their levels in average sea water. Water samples from enclosed crater lakes are considerably enriched in both Si and Mn. (Knapp-USGS)
W72-11663

THE DISTRIBUTION OF CO, CR, CU, FE, MN, NI AND ZN IN FRAMVAREN, A NORWEGIAN ANOXIC FJORD,
Scripps Institution of Oceanography, La Jolla, Calif.
D. Z. Piper.
Geochimica et Cosmochimica Acta, Vol 35, No 2, p 531-550, February 1971. 8 fig, 6 tab, 35 ref.

Descriptors: *Chemical analysis, *Sediments, *Chemical properties, *Fjords, *Trace elements, Cobalt, Copper, Chromium, Iron, Manganese, Nickel, Zinc, Mineralogy, Organic matter, Suspension, Distribution, Dissolved oxygen, Environmental effects.
Identifiers: Norway.

Sediments collected from a Norwegian anoxic fjord were analyzed for Fe, Co, Cr, Cu, Mn, Ni and Zn. With the exception of Zn, the dominant factors affecting their distribution are the mineralogy of the land-derived lithogenic material and the abundance of organic matter. The importance of the chemical properties of the sedimentary environment upon the distribution of Zn, and to a lesser extent Fe and Co, was evaluated by comparing their distributions in the fraction of sediment soluble in dilute acid with their suspension distributions in the water. Within suspended matter filtered from the water, Fe and Co exhibit fivefold and zinc a sevenfold increase in abundance to a depth of 20 m. Below 40 m, Co decreases in abundance in both suspended phases and sediments. Chromium is relatively abundant in suspended phases from the upper 20 m, but decreases sharply below this depth. The concentrations of Fe, Co and Cr, in filtered water samples, roughly parallel that of PO4, a decomposition product of organic matter. This supports analyses of the sediments which showed Fe and Co to be partially dependent upon the abundance of organic matter. (Woodard-USGS)
W72-11680

SIMULTANEOUS DETERMINATION OF COPPER AND MANGANESE WITH SODIUM DIETHYL DITHIOCARBAMATE,
Bridgeport Univ., Conn. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W72-11696

TITRIMETRIC MICRODETERMINATION OF YTTRIUM AND SCANDIUM: DISODIUM SALT OF RHODIZONIC ACID AS COMPLEXING AGENT,
Allahabad Univ., (India). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W72-11699

SENSITIVITY OF DETECTION OF THE ELEMENTS BY PHOTOELECTRON SPECTROMETRY,
Shell Development Co., Emeryville, Calif.
For primary bibliographic entry see Field 05A.
W72-11705

STANDARD SOLUTION FOR REDOX POTENTIAL MEASUREMENTS,
Foxboro Co., Mass. Research Center.
T. S. Light.
Analytical Chemistry, Vol. 44, No. 6, p 1038-1039, May 1972. 2 tab, 5 ref.

Descriptors: *Oxidation-reduction potential, *Electrodes, *Measurement, *Chemical analysis, Potentiometers, Quality control, Evaluation, Calibrations, Electrolytes.
Identifiers: Instrument development, Potentiometric titrations, Platinum electrode, Ion selective electrodes, Precision, Accuracy.

A ferrous-ferric solution has been formulated as a reasonably stable solution for calibrating or checking redox electrode systems. Experiments were conducted to measure the potentials of the platinum electrode against various reference electrodes in this solution. In closed glass and suitable plastic storage vessels the solution is stable for an indefinite period and increased in emf by less than 3 mV after a week of stirring in an open breaker and constant monitoring. It has been used at ambient conditions in the field with emf's within plus or minus 10 mV of those obtained experimentally. The solution permits a quantitative check on redox systems and provides a reference point for control data for a given process. (Mortland-Battelle)
W72-11707

TURBIDIMETRY VIA PARALLEL PHOTOMETRIC ANALYSIS-DETERMINATION OF SULFATE,
Oak Ridge National Lab., Tenn. Analytical Chemistry Div.
For primary bibliographic entry see Field 05A.
W72-11708

THIN LIQUID INFRARED CELL FOR QUANTITATIVE STUDIES USING AQUEOUS SOLUTIONS,
General Technologies Corp., Reston, Va.
For primary bibliographic entry see Field 05A.
W72-11715

THE CONTRIBUTION OF GAS CHROMATOGRAPHY TO THE IDENTIFICATION OF SUBSTANCES,
Akademiya Nauk SSSR, Moscow. Institut Fizicheskoi Khimii.
V. G. Arakelyan, and K. I. Sakodynskii.
Chromatographic Reviews, Vol 15, No 2-3, p 93-110, December 1971. 1 tab, 182 ref.

Descriptors: *Gas chromatography, *Chemical analysis, Pollutant identification, Evaluation, Mathematical studies, Retention, Reliability, Equations, Organic compounds, Efficiencies, Methodology, Graphical analysis, *Analytical techniques, *Chromatography.
Identifiers: Column chromatography.

The problems of gas chromatographic identifications are reviewed in three parts: identification by means of one column or stationary phase, identification using several columns, and calculation methods. The investigation of the possible applications of the known methods of analytical, graphical and calculation identification indicates the considerable contribution of GC to the qualitative analysis of chemical compounds. During a short period, GC has developed from an analytical method for the separation of Substances into a powerful tool for physicochemical analysis, while remaining a simple, reliable, rapid and convenient method for the qualitative and quantitative analysis of mixtures of compounds. The approach to chromatographic identification has improved along with the development of GC. From simple methods, measurements by plotting graphs and empirical observations have evolved the application of correlations between characteristic values to the study of equations, which has led to the development of a number of complex methods and to putting the whole process on a scientific basis. (Mackan-Battelle)
W72-11725

FLAME IONISATION DETECTION (FLAME IONISATION PHENOMENA),
Ceskoslovenska Akademia Ved, Brno. Ustav Instrumentalni Analyticke Chemie.
P. Bocek, and J. Janak.
Chromatographic Reviews, Vol 15, No 2-3, p 111-150, December 1971. 10 fig, 323 ref.

Descriptors: Chemical reactions, Ionization, *Gas chromatography, *Chemical analysis, Oxygen, Nitrogen compounds, Organic compounds, Halogens, Metals, Ions, Temperature, Pressure, Electric currents, Electric fields, Mathematics, Physical properties, Hydrogen, *Reviews.
Identifiers: *Flame ionization gas chromatography, Flame ionization detector, Soot, Stoichiometry, Combustion, Hydrocarbons.

A review is given of flame ionization detection, an important principle in the detection of substances in gas chromatographic analysis. Those areas considered are: (1) mechanisms of flame ionization: flame types, the ionization of metals and oxygen-, nitrogen-, and halogen-containing substances; (2) the relation of ionization to characteristics of the flame system: ion profiles, the effects of sample introduction rates and physical variables such as pressure and temperature upon the flame system; and (3) the interaction between the electric field and the flame: currents, the combustion process. (Mackan-Battelle)
W72-11726

2L. Estuaries

JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 05B.
W72-11131

ON THE OCEANOGRAPHY OF JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 05B.
W72-11132

THE TIDES IN JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 05B.
W72-11133

CIRCULATION IN JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 05B.
W72-11134

PUGET SOUND OCEANOGRAPHIC RESOURCES.
Committee on Commerce (U.S. Senate). Subcommittee on Oceans and Atmosphere.
For primary bibliographic entry see Field 06G.
W72-11187

AN ANNUAL REPRODUCTIVE CYCLE OF THE GAPER CLAM, TRESUS CAPAX (GOULD), IN SOUTH HUMBOLDT BAY, CALIFORNIA,
Department of Fisheries and Forestry, Halifax (Nova Scotia).
J. R. Machell, and J. D. De Martini.
Calif Fish Game. Vol 57 No 4 p 274-282. 1971.
Identifiers: Annual, California, *Clams, Humboldt Bay (Calif), *Reproduction, Seasonal, Tresus capax.

A gaper clam bed in south Humboldt Bay was sampled from April, 1966, through April, 1967, to determine an annual reproductive cycle of the clams. Phases of gonad development are described. Ripe gonads were found from Nov. through Jan. Spawning occurred from Jan. through March and began at the time of the seasonal minimums in water temperature and salinity. Spent specimens first appeared at the end of Feb. and were present through April. Leucocytes were common in spent gonads and were associated with cytolysis of residual gametes. An inactive phase followed beginning in May and ending in July. Sex was not discernible during this latter phase. An active phase started in Aug. and continued into Nov. Gonia apparently are derived from follicular cells of the gonad. Sex is discernible from the active phase into the spent phase. The sex ratio was 1:1. The relationship of gonadal glycogen content, as determined by Reid (1969), and phases of gonad development are disscussed.--Copyright 1972, Biological Abstracts, Inc.
W72-11318

THE 1965-1967 MIGRATIONS OF THE SACRAMENTO-SAN JOAQUIN ESTUARY STRIPED BASS POPULATION,
California State Dept. of Fish and Game, Sacramento.
J. J. Orsi.
Calif Fish Game. Vol 57 No 4 p 257-267. 1971.
Identifiers: *Bass, California, *Fish migration, Morone saxatilis, Sacramento-San Joaquin Estuary (Calif).

Striped bass (Morone saxatilis) migrations are described based on tag returns from the third in a series of tagging programs dating back to 1950. In 1965-66 the general migration pattern was essentially the same as it was in 1958-61. No return to the pattern of the early 1950's in which few bass entered San Francisco Bay or the Pacific Ocean occurred. In general, larger fish moved farther downstream. Only medium-sized and large fish went to sea, and then only in the summer and fall. Small fish were the only ones common in freshwater during the summer. Major differences between 1958-61 and 1965-66 were a population shift from San Francisco Bay to San Pablo Bay during the winter, a downstream movement of small and medium-sized fish into San Francisco Bay during the fall, a shorter residence time in the ocean during the summer and a reduced oceanic range. All are difficult to explain. Fish length seemed to influence migration pattern more than sex did.--Copyright 1972, Biological Abstracts, Inc.
W72-11327

LIFE HISTORY AND ECOLOGY OF THE CYPRINID FISH NOTROPIS PETERSONI IN NORTH CAROLINA WATERS,
North Carolina Wildlife Resources Commission, Raleigh.
J. R. Davis, and D. E. Louder.
Trans Am Fish Soc. Vol 100, No 4, p 726-733. 1971. Illus.

Identifiers: *Shiners, *Life history studies, Crustaceans, Ecology, Fish diets, North Carolina, Notropis petersoni.

This study was designed to expand the knowledge of the life history and ecology of N. petersoni Fowler. N. petersoni, commonly called the coastal shiner, is found along the Coastal Plains from North Carolina to Mississippi. In North Carolina its range is confined to a few streams in the lower Cape Fear River Basin, in the Waccamaw River, and in Lake Waccamaw. The food of the coastal shiner is principally crustaceans with plant material being taken incidental to feeding. Observation of N. petersoni in aquaria indicated that their diet depends on available food, however, they prefer zooplankton. The lotic population of N. petersoni appears to feed on the same type of material as the lentic populations. The pH range found in the habitat of N. petersoni was 5.3 to 6.9 with the minimum pH tolerance limit obtained for N. petersoni under laboratory conditions being 4.9. Dissolved O2 ranged from 1.4 to 7.0 ppm under field conditions with a minimum tolerance limit of 0.9 ppm under laboratory conditions. The highest water temperature associated with N. petersoni was 84F in lotic environments and 89F in Lake Waccamaw. When water temperatures declined below 52F, N. petersoni moved to deeper water. Growth comparisons were made between lentic and lotic environments by the 't' test with the data indicating no significant difference between Lake Waccamaw, the lotic environment, and Livingston, Town, and Six Runs Creeks for age I and II fish. However, there was a significant difference between the Lake Waccamaw and the Northeast Cape Fear River populations.–Copyright 1972, Biological Abstracts, Inc.
W72-11333

A COMPUTER MODEL OF THE TIDAL PHENOMENA IN COOK INLET, ALASKA,
Alaska Univ., Fairbanks, Inst. of Water Resources.
R. F. Carlson, and C. E. Behlke.
Report IWR-17, 1972. 69 p., 14 fig, 11 ref, 4 append. OWRR A-028-ALAS (1).

Descriptors: *Tidal hydraulics, *Computer Models, *Finite Difference Method, *Inlets, Tides, Estuaries, Open Channel Flow Tidal Waters, Mathematical Models, Namerical Analysis, Translatory waves, *Alaska, *Model studies.
Identifiers: *Cook Inlet, *Knik Arm, Anchorage (Alas).

Cook Inlet, especially Knik Arm, Alaska, because of its strategic location represents an important but little understood resource to the State of Alaska. Its dominant hydraulic characteristics are the 30 foot tidal range, large (up to 8 knots) tidal currents, an unusual geometric configuration, and a large glacial sediment load. A one-dimensional finite difference computer model of the Inlet and Arm which calculates the flows and water surface elevations was constructed as a beginning effort in understanding the nature of the tidal hydraulic phenomena. Along with several simple analytic methods, the computer generated data indicated that the hydraulic regime may be adequately represented by one dimension, the high tides are not explained by the Inlet's length being close to that of one quarter-wave length, the existing data base does not justify a very complex modeling effort, and because of the importance of the Inlet, a great deal of additional studies are needed.
W72-11355

THE SEASONAL DYNAMICS OF VITAMIN B12 AND PHYTOPLANKTON VARIABILITY IN THE DALNEZELENETSKAYA GUBA (INLET) OF THE BARENTS SEA,
Murmanskii Morskoi Biologicheskii Institut (USSR).
For primary bibliographic entry see Field 05C.
W72-11421

GENERAL STUDY OF CHEMICAL POLLUTANTS THROWN INTO SEA WATER: INVENTORY AND TOXICITY STUDIES,
Institut National de la Sante et de la Recherche Medicale, Nice (France). Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale.
For primary bibliographic entry see Field 05B.
W72-11428

WATER MEASUREMENTS OF COASTAL LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
B. Barrett.
Available from NTIS, Springfield, Va 22151 as COM-72-10085, $3.00 in paper copy, $0.95 in microfiche. 1970. 196 p. BCF Project 2-22-R.

Descriptors: *Water measurement, *Coasts, *Estuaries, *Louisiana, Water yield, Volume, Surface waters, Water pollution control, Ecology, Ecosystems, Water pollution sources, Basic data collections, Lakes, Rivers, Gulf of Mexico, Water levels, Depth.
Identifiers: *Coastal waters (La), *Water area.

Water measurements of coastal Louisiana were made from the most recent maps available. Total water surface area, water volume, and number of surface acres at different water depths were determined. The increased use of Louisiana's coastal area during recent years by industry and municipalities, the exploitation of the region for natural gas, oil, and sulphur, and a growing fishing industry have created an immediate need for more information about the State's estuaries. Water pollution, future needs for greater food production from the sea, preservation of the estuaries, and the critical reduction of water table levels are a few of the problems which have recently instigated a great deal of research in Louisiana's coastal area. Water area and water volume data are essential to much of this research. The total water area in coastal Louisiana is 3,378,924 acres, and the total water volume is 23,140,497 acre-feet. (Woodard-USGS)
W72-11446

MAGNUSON COASTAL ZONE MANAGEMENT ACT OF 1972.
For primary bibliographic entry see Field 06E.
W72-11528

SOME RELATIONS OF LAND DRAINAGE, NUTRIENTS, PARTICULATE MATERIAL, AND FISH CATCH IN TWO EASTERN CANADIAN BAYS,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 05C.
W72-11566

ACID-IRON WASTE DISPOSAL AND THE SUMMER DISTRIBUTION OF STANDING CROPS IN THE NEW YORK BIGHT,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W72-11570

MACROBENTHOS OF THE PAMLICO RIVER ESTUARY, NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W72-11580

SEDIMENTARY DYNAMICS UNDER TIDAL INFLUENCES, BIG GRASS ISLAND, TAYLOR COUNTY, FLORIDA,
Florida State Univ. Tallahassee. Dept. of Geology and Oceanography.
For primary bibliographic entry see Field 02J.
W72-11665

A WATER BUDGET STUDY OF PUGET SOUND AND ITS SUBREGIONS,
Washington Univ., Seattle. Dept. of ceanography.
M. A. Friebertshauser, and A. C. Duxbury.
Limnology and Oceanography, Vol 17, No 2, p 237-247, March 1972. 6 fig, 6 tab, 7 ref.

Descriptors: *Water balance, *Hydrologic budget, *Sounds, *Washington, *Salinity, Estuaries, Straits, Bays, Streamflow, Water quality, Water chemistry, Water circulation.
Identifiers: *Puget Sound.

A water budget study for Puget Sound and its principal subregions, based on the freshwater, seawater, and total water budgets, determines the mean fluxes of water into and out of these regions, the freshwater content, and the change in freshwater content by month and by year. Data used to calculate the budgets include monthly mean values of precipitation, evaporation, runoff, changes in sea level, mean salt content, and the salinities of inflowing and outflowing waters for each subregion. The fluxes of water calculated in the budget analysis yield an approximation of flushing efficiency and replacement time for Puget Sound and its subregions. The monthly freshwater content, along with the fluxes of water and their salt load, indicates that river runoff does not by itself control the freshwater content of a particular subregion; considerable freshwater is added by the inflow of water from an adjacent embayment. (Knapp-USGS)
W72-11666

THE MEASUREMENT OF CONDUCTIVITY AND TEMPERATURE IN THE SEA FOR SALINITY DETERMINATION,
Department of the Environment, Victoria (British Columbia). Frozen Sea Research Group.
For primary bibliographic entry see Field 07B.
W72-11669

NATIONAL SHORELINE STUDY--TEXAS COAST SHORES REGIONAL INVENTORY REPORT.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 02J.
W72-11674

USE OF CONTINUOUS RECORDING SALINITY-TEMPERATURE-PRESSURE INSTRUMENTATION AT OCEAN STATION P (50N, 145W),
Fisheries Research Board of Canada, Nanaimo (British Columbia). Pacific Oceanographic Group.
For primary bibliographic entry see Field 07B.
W72-11722

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

INCREASING PERMEABILITY OF REVERSE OSMOSIS MEMBRANES,
Canadian Patents and Development Limited, Canada (assignee).
J. Kopecek, and S. Sourirajan.
U. S. Patent No 3,536,612, 7 p, 5 fig, 4 tab, 1 ref; Official Gazette of the United States Patent Office Vol 879, No 4, p 1232, October 27, 1970.

Descriptors: *Patents, *Reverse osmosis, *Membranes, Separation techniques, Water purification, *Permeability, Equipment, Water treatment, Water quality.

This invention provides a method of altering the pore structure and increasing the permeability of a reverse osmosis asymmetric membrane without

reducing its separation factor. The side having the larger pore openings is contacted with a liquid at a pressure causing a significant back-flow of liquid and enlargement of the smaller pore openings on the opposite side of the membrane. (Sinha-OEIS)
W72-11150

PRODUCTION OF CHLORINE FROM SEA WATER,
K. Yanagase, T. Yanagase, and Y. Suginohara.
U. S. Patent No 3,536,598, 5 p, 12 fig, 2 ref; Official Gazette of the United States Patent Office Vol 879, No 4, p 1228, October 27, 1970.

Descriptors: *Patents, Sea water, *Electrolysis, *Chlorine, Water quality.

A method is provided for producing effective chlorine by direct electrolysis of sea water. Sea water is caused to flow steadily and simultaneously in parallel anodic and cathodic flow paths respectively on opposite sides of a porous diaphragm placed in parallel position between them. Deposition of impurities on the diaphragm is prevented by controlling the pH of the electrolyte. (Sinha-OEIS)
W72-11151

MULTIPLE EFFECT DISTILLATION APPARATUS,
General Electric Co., Schenectady, N.Y.
C. W. Lotz.
U. S. Patent No 3,536,591, 3 p, 3 fig, 11 ref; Official Gazette of the United States Patent Office Vol 879, No 4, p 1227, October 27, 1970.

Descriptors: *Patents, *Distillation, Equipment, Treatment, Separation techniques, Saline water, *Desalination, Water treatment, Water purification, *Heat transfer, Water quality.

Distillation compartments are constructed within a chamber. Each has a lower heat transfer wall which is inclined with respect to the local vertical at some angle such as 70 degrees and which has a top surface constituting an evaporation surface. Each compartment also has an upper heat transfer wall having a bottom surface which constitutes a condensing surface for the vapors that are produced. (Sinha-OEIS)
W72-11152

VALVE ASSEMBLY AND SELF-CLEANSING BRINE WELL SCREEN,
For primary bibliographic entry see Field 05G.
W72-11158

DISTILLATION APPARATUS HAVING CONCENTRIC RISER, EXPANSION AND CONDENSING CHAMBERS,
Vaponics, Inc., Waltham, Mass.
V. C. Smith.
U. S. Patent No 3,660,246, 3 p, 3 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 898, No 1, p 237, May 2, 1972.

Descriptors: *Patents, Water purification, *Distillation, *Condensation, Equipment, Separation techniques, Water quality, Potable water, *Desalination.

Impure water is heated in a distillation zone to form steam. The steam passes through a riser which is constructed to cause the steam to move in a circular path. The steam passes through an expansion zone and then into a condensation zone. A filter may be provided between the riser and the distillation zone to entrain impurities. (Sinha-OEIS)
W72-11164

REVERSE OSMOSIS DEMINERALIZATION OF ACID MINE DRAINAGE.
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
For primary bibliographic entry see Field 05D.
W72-11598

RECYCLE OF PAPERMILL WASTE WATERS AND APPLICATION OF REVERSE OSMOSIS,
Green Bay Packaging, Inc., Wis.
For primary bibliographic entry see Field 05D.
W72-11599

AMENABILITY OF REVERSE OSMOSIS CONCENTRATE TO ACTIVATED SLUDGE TREATMENT,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
For primary bibliographic entry see Field 05D.
W72-11606

REVERSE OSMOSIS FOR WATER RECLAMATION,
General Dynamics, San Diego, Calif. General Atomic Div.
For primary bibliographic entry see Field 05D.
W72-11647

VIRUS REJECTION BY THE REVERSE OSMOSIS-ULTRAFILTRATION PROCESSES,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 05D.
W72-11650

3B. Water Yield Improvement

PROJECT COLD RAIN,
Air Weather Service, Scott AFB, Ill.
R. I. Sax, and T. S. Cress.
Available from the National Technical Information Service as AD-736 004, $3.00 in paper copy, $0.95 in microfiche. Technical Report 245, December 1971. 45 p, 41 fig, 2 tab, 5 ref.

Descriptors: *Cloud seeding, *Texas, *Weather modification, *Droughts, Meteorology, Rain, Water shortage, Cloud physics, Storms, Precipitation (Atmospheric).

An Air Force and Bureau of Reclamation rain-augmentation project was designed to help alleviate severe drought conditions in south-central Texas. From June 6, 1971 until June 30, 1971, three Air Weather Service WC-130B aircraft, specially equipped to deliver pyrotechnic flares, carried out a total of 35 cloud-seeding missions. More than 1000 seeding penetrations were made into more than 250 individual cumulus towers and 2671 flares, each emitting 25 grams of nucleating silver-iodide smoke, were expended. The operations encompassed a geographical area of approximately 75,000 square miles. On at least 25% of the operating days, significant localized increases in rainfall were observed following seeding. However, natural rainshower activity during the month was intensive and widespread enough to mask any large-scale contribution directly attributable to the seeding operations. Instrumentation was not sufficiently adequate to attempt an accurate analysis of seeding effectiveness. (Knapp-USGS)
W72-11286

THE EFFECT OF THE INADEQUATE MOISTURE AND LOW TEMPERATURES OF THE TRANSBAIKAL STEPPES ON THE MORPHOPHYSIOLOGICAL PROPERTIES OF HERBACEOUS PLANTS,
A. A. Gorshkova, L. D. Kopytova, and A. I. Spivak.
Izv Biol-Geogr Nauch-Issled Inst Irkutsk Univ. Vol 23 No 3 p 67-79. 1969.
Identifiers: Drought, Growth, *Herbaceous plants, *Moisture stress, Plant physiology, Plants, Steppes, *Temperature, *Transbaikal steppes, USSR, Xerophytes.

The continental conditions of the steppe raions of the southeastern Transbaikal have made possible the formation of a series of unique morphological traits of the herbaceous vegetation: low stature, predominance of rosette, semi-rosette, and cushion-shaped growth forms, polycephalous vertical rhizomes, shoots of the polycyclic type, etc. The phases of development of the plants studied are very similar during the growing period. With respect to water balance and its changes during drought, the following types are distinguished smong the herbaceous plants: euxerophytes, cryoxerophytes, and hemixerophytes. The most favorable water balance during drought is found in the hemixerophytes and cryoxerophytes.--Copyright 1972, Biological Abstracts, Inc.
W72-11404

ODROP--OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM,
Weather Science, Inc., Norman, Okla.
J. L. Sutherland, L. W. Cooper, and D. R. Booker.
Available from NTIS Springfield, Va 22152 as PB-207 043, $3.00 in paper copy, $0.95 in microfiche. Final Contract Report December 1971. 43 p, 6 fig, 5 tab, 16 ref, append. USBR Contract No 14-06-D-7192.

Descriptors: *Artificial precipitation, *Cloud seeding, *Oklahoma, *Silver iodide, Aircraft, Clouds, Radar, Data collections, Rainfall, Evaluation, Weather modification, Droughts.

Cloud seeding was conducted to augment precipitation in drought-stricken areas of Oklahoma during the two-month period beginning August 15, 1971. Over 175 clouds were seeded with about 42,000 grams of silver iodide released pyrotechnically by aircraft at cloud base. Digitized radar data from the National Severe Storms Laboratory WSR-57 radar showed that the seeding-related rainfall amount on 11 of the 19 seeding days was about 50,000 acre-feet or 16 billion gallons. Average rainfall intensity on five selected days was higher for seeded clouds than for non-seeded clouds. (Woodard-USGS)
W72-11657

3C. Use of Water of Impaired Quality

METHODS FOR EFFECTIVE RECLAMATION OF SALINE CALCAREOUS PEAT SOILS IN THE UKRAINE (PRIYEMY EFFEKTIVNOGO OSVOYENIYA ZASOLENNYKH KARBONATNYKH TORFYANYKH POCHV USSR),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11126

GENESIS OF GYPSUM SOLONCHAKS OF SOUTHERN KIRGHIZIA,
For primary bibliographic entry see Field 02G.
W72-11335

EFFECT OF GROUNDWATER TABLES ON THE WATER--SALT REGIME OF SOILS AND THEIR EVAPORATION CAPACITY IN THE VOLGA-AKHTUBA FLOODPLAIN,
V. V. Kolpakov, and S. A. Abdil'Din.
Dokl Mosk S-Kh Akad Im K A Timiryazev. 149. p 151-156. 1969.
Identifiers: Corn -M, *Evaporation, *Floodplains, Groundwater tables, Irrigation, Plant, *Saline soils, Soils, *Volga-Akhtuba (USSR).

With high (1-3 m) groundwater tables (WT), the loss of water was chiefly dependent upon the thermal conditions, height of WT and the plant cover. The maximum total loss of water by the field occurred in June-Aug., (57-63% of the total loss of water in May-Sept. on a field without plant cover, 62-80% on a corn field). Supply of water from the

WT was 54-63% when the WT lay at 1 m, 15-19% and 4%, respectively, when it lay at 2 and 3 m. High WT (0.5-1 m) increased the contents of solid residue and Cl. Irrigation with 800 cu m/ha desalinated the top layer but caused some accumulation of salts in the underlying layer.--Copyright 1972, Biological Abstracts, Inc.
W72-11346

DYNAMICS OF THE WATER-SALT REGIME OF THE MAJOR SOIL TYPES ON THE LEFT BANK OF KZYL ORDA IRRIGATED MASSIF,
Y. M. Popov.
Tr Inst Pochvoved Akad Nauk Kaz SSR. 17. 66-74. 1969.
Identifiers: Bank, Bog, *Irrigation, *Kzyl orda, Massif, Meadow, Paddy-M, Salt, *Soil types, Woodland, *Salinity.

The prevailing soils are alluvial-meadow ('tugai'-riparian woodland in Central Asia) soils of low salinity, 70-90 tons/ha. Depressions between channels contain meadow bog soils undergoing desertization with widely varying moisture contents (1500-5000 t/ha) and salinity (43-230 tons/ha). Paddy bog soils are distinguished by constant moisture contents (4000-5000 tons/ha) salinity (50-60 tons/ha). The water-salt regime of the soils is described.--Copyright 1972, Biological Abstracts, Inc.
W72-11420

TOTAL EVAPORATION DURING LEACHING OF SALINE SOIL (SUMMARNOYE ISPARENIYE PRI PROMYVKAKH ZASOLENNYKH ZEMEL'),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02D.
W72-11455

DETERMINATION OF EVAPORATION FROM FREE-WATER SURFACES DURING LEACHING OF SALINE SOIL (RASCHET ISPARENIYA S VODNOY POVERKHNOSTI PRI PROMYVKAKH ZASOLENNYKH ZEMEL'),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02D.
W72-11456

CERTAIN AGRICULTURAL TECHNIQUE PROBLEMS OF RAISING FOREST PLANTATIONS IN SALINE LANDS OF THE KURA--ARAKS LOWLAND,
S. M. Mamedov.
Tr Azerb Nauchno-Issled Inst Lesn Khoz Agrolesomelior. 8: 231-243. 1968.
Identifiers: Agriculture, Forests, *Irrigation, *Kura-Araks lowlands, Minerals, Plantations, *Saline soils.

In 1951-1962 the salt resistance of 43 tree and shrub species was studied; their scale showing the soil division into 5 agricultural forest salinity categories is given. Satisfactory conditions for the growth of roots of the tree and shrub species were found when the stable level of slightly mineralized groundwaters occurred deeper than 150 cm and intensely mineralized groundwaters deeper than 200 cm. Two methods of the establishment of forest plantations are recommended: plantations with wide interrows with planting along the irrigation furrows on 2 sides (ribbon planting) and dense plantations by 'coulisses' with wide interrows between the 'coulisses.' Irrigation standards are given for forest stands, as well as time and number of vegetation irrigations and the main types for mixing of tree and shrub species.--Copyright 1972, Biological Abstracts, Inc.
W72-11611

THE DYNAMICS OF THE VEGETATION OF THE SOLONETZ-SOLONCHAK COMPLEX OF THE NORTHERN FOREST-STEPPE OF OMSK OBLAST AS RELATED TO CHANGES IN SOIL SALT AND MOISTURE CONTENT,
For primary bibliographic entry see Field 02I.
W72-11716

3D. Conservation in Domestic and Municipal Use

WHY METERING MAKES SENSE.

The American City, Vol. 87, No. 4, p 72-75, 128-129, April, 1972.

Descriptors: *Water utilization, *Use rates, *Economic impact, Economic efficiency, Water demand, Water supply.
Identifiers: *Metering, *Water meters, Flat rates.

Water rates based on metering offer several advantages. First, since fair rates must be based on the amount of water used, metering provides the community with an opportunity to establish an equitable rate system. Second, metering prevents waste. With the ever-increasing demand for water and the spiraling processing costs, waste can no longer be tolerated. Third, meters pay for themselves in reduced plant requirements, postponement of plant additions, and the development of new water sources. Fourth, metering results in a permanent reduction in water use, although the percentage of reduction usually decreases slightly after several years. Fifth, remote-read meters have eliminated the need for meter readers to enter the premises, and have consequently ended the lock-out and call-back problems. The experience of Kingston, N.Y., offers an excellent example of metering's advantages. In 1958, Kingston began a universal metering program that resulted in a 27 per cent drop in average use--from 5.45 mgd in 1957 to approximately 4.0 mgd for the years 1960 through 1963. The peak day has never exceeded 6.7 mgd since metering began, whereas in 1957 it reached a record 8.3 mgd. Consequently, no increases in supply have been needed. (Settle-Wisconsin)
W72-11221

FEASIBILITY OF UTILITY TUNNELS,
Chicago City Dept. of Water and Sewers, Ill.
J. B. W. Corey.
Journal of the American Water Works Association, Vol 64, No 4, p 226-229, April 1972. 2 photo, 4 fig.

Descriptors: *Feasibility studies, *City planning, *Utilities, Legal aspects, Regulation, Management, Coordination, Economic feasibility, Engineering, Aesthetics.
Identifiers: *Utility tunnels.

The American Public Works Association Research Foundation concluded an eighteen month investigation on the feasibility of utility tunnels in urban areas in February, 1971. The following conclusions were made. (1) The advantages of utility tunnels undoubtedly outweigh the disadvantages in applicable urban situations, although some of the important advantages require quantification in monetary terms. (2 No general conclusion can be stated as to the feasibility of utility tunnels, since the feasibility will depend on the conditions present in each project. (3) Economic feasibility is expected to be found primarily in the high-density districts. (4) Gas, electric power distribution, telephone, water, steam, and other utilities found in the urban street right-of-way can be safely and dependably accommodated in a utility-tunnel system if proper precautions are taken and coordination among the utilities is effected. (5) Legal, regulatory, and management problems, although complex, can be resolved. (6) The provision of customer services leading from the utility-tunnel will be one of the more difficult engineering problems. (7) It can be expected that the utilities industry will be reluctant to move into utility-tunnel systems until they can be proved economically feasible and of general benefit to the public. (8) Engineering-economic analysis of the feasibility of utility-tunnel systems will be influenced by the values placed on aesthetics. (Strachan-Chicago)
W72-11474

7 PRINCIPLES FOR AN URBAN LAND POLICY,
E. N. Bacon.
Urban Land, Vol 30, No 4, p 3-8, April 1971. 6 fig.

Descriptors: *Planning, *Decision making, *City planning, *Land use, Ecology, Political aspects, Technology, Growth rates.
Identifiers: *Urban land policy, *Policy making.

Orderly, desirable growth can be achieved by developing a new combination of political and technological forces. An effective urban land policy is necessary if the U.S. is to make progress in the fight against urban chaos. Three elements in juxtaposition become the force in shaping the direction and character of city growth: (1) concern for ecology, (2) a clarification of the effect this new policy will have on both the rights of land owners and developers, along with the responsibilities of government, and (3) a national program of coordinated and purposeful public service facility delivery systems. Seven principles are proposed as a foundation for a more effective urban land policy. They are: land division, efficient land use, sewage limitations, public service system, growth management, rebuilding of the central city, and skillful interaction. (Strachan-Chicago)
W72-11475

CREATIVE WATERFRONT DEVELOPMENT,
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario). Waterfront Task Force.
K. G. Higgs, and W. A. McLean.
Journal of Soil and Water Conservation, Vol 27, No 2, p 62-65, March-April 1972. 3 photo.

Descriptors: *Planning, *Decision making, *Land use, *Lakes, Transportation, Jurisdiction, Control.
Identifiers: *Waterfronts, *Implementation, *Toronto.

The waterfront plan for the Metropolitan Toronto planning area represents a major attempt at creative waterfront development over a significant stretch of the Lake Ontario shoreline. The objectives of the plan are achievable and implementation is provided for by an agency which is both politically and technically qualified for the job, i.e., the Metropolitan Toronto and Region Conservation Authority. Preparation of the waterfront plan initially involved setting objectives for the plan based on an inventory of physical characteristics, existing development, development potential, and development constraints. Early in the planning process, studies were conducted to examine existing land use, waterfront access, transportation patterns, ownership and land values, and the relationships of municipal and agency jurisdictions within the planning area. Unique natural areas, viable marshes, quality beaches, and patterns of erosion and accretion were identified. (Strachan-Chicago)
W72-11485

SOLVING THE COMBINED SEWER OVERFLOW PROBLEM OF A MAJOR CITY,
Weston (Roy F.), Inc., Westchester, Pa.
For primary bibliographic entry see Field 05G.
W72-11488

A MODEL ON MUNICIPAL WATER DEMAND: A CASE STUDY OF NORTHEASTERN ILLINOIS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Geography.
For primary bibliographic entry see Field 06D.
W72-11489

CHICAGO'S LAKEFRONT PARKLAND: A GREAT LEGACY UP FOR GRABS,
For primary bibliographic entry see Field 06B.
W72-11491

COUNTY-WIDE STUDY FORECASTS WATER USE,
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06D.
W72-11492

POWER STRUCTURE STUDIES AND ENVIRONMENTAL MANAGEMENT: THE STUDY OF POWERFUL URBAN PROBLEM-ORIENTED LEADERS IN NORTHEASTERN MEGALOPOLIS,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 05G.
W72-11505

QUALITY OF STORMWATER DRAINAGE FROM URBAN LAND,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
For primary bibliographic entry see Field 05B.
W72-11651

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE AUSTIN, TEXAS METROPOLITAN AREA, 1970,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W72-11661

3E. Conservation in Industry

EFFECT OF WATER AVAILABILITY ON MANUFACTURING EMPLOYMENT IN THE TENNESSEE VALLEY REGION,
Tennessee Univ., Knoxville. Coll. of Business Administration.
For primary bibliographic entry see Field 06B.
W72-11208

AN ECONOMIC ANALYSIS OF WATER RESOURCE USE AND USE CONFLICTS OF SELECTED INDUSTRY GROUPS IN ALABAMA WITH RESPECT TO AREA DEVELOPMENT,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11218

3F. Conservation in Agriculture

RECLAMATION AND WATER MANAGEMENT (MELIORATSIYA I VODNOYE KHOZYAYSTVO),
Ministerstvo Melioratsii i Vodnogo Khozyaistva Ukrainskoi, Kiev (USSR).
For primary bibliographic entry see Field 05D.
W72-11120

EFFECTS OF FERTILIZERS AND WASTE WATERS OF THE BORTNICHI IRRIGATION SYSTEM ON QUALITY OF WINTER WHEAT (VLIYANIYE UDOBRENIY I STOCHNYKH VOD BORTNICHSKOY OROSITEL'NOY SISTEMY NA KACHESTVO ZERNA OZIMOY PSHENITSY),
Ukrainskii Nauchno-Issledovatelskii Institut Fisiologii Rastenii, Kiev (USSR).
For primary bibliographic entry see Field 05D.
W72-11121

EFFECTS OF WETTING ON NITROGEN REGIME OF OLD-PLOWED PEAT SOIL, BASED ON POT TESTS (VLIYANIYE STEPENI UVLAZHNENIYA NA AZOTNYY REZHIM STAROPAKHOTNOY TORFYANOY POCHVY (PO DANNYM VEGETATSIONNOGO OPYTA)),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11125

THE MINIMUM SOIL MOISTURE AS AN INDICATION FOR IRRIGATION,
Institute of Water Engineering and Land Improvement, Sofia (Bulgaria).
R. Boyanov, V. Tatarova-Krusteva, and S. Koleva.
Pochvozn Agrokhim. Vol 5, No 2, p 9-17. 1970. Illus. English summary.
Identifiers: Constants, Hydrology, *Irrigation, Meteorology, Minimum, *Soil moisture, Physiology, Plants.

Pre-watering soil moisture should be determined on the basis of pedological, phytoecological and meteorological considerations: the relationship between the soil and hydrological constants (the maximum water holding capacity, wilting points and moisture at which capillaries break) is different among soil types in horizons of a given profile; the water potential in different soil types with similar moisture content varies; the physiological features of the individual crops are different, and meteorological conditions vary throughout the growth period.--Copyright 1972, Biological Abstracts, Inc.
W72-11217

THE EFFECTS OF DROUGHT STRESS ON RESPIRATION OF ISOLATED CORN MITOCHONDRIA,
Illinois Univ., Urbana. Dept. of Agronomy.
D. T. Bell, D. E. Koeppe, and R. J. Miller.
Plant Physiol, Vol 48, No 4, p 413-415, 1971, Illus.
Identifiers: ADP, Corn M, Drought, Malate, *Mitochondria, NAD, Oxygen, Pyruvate, *Respiration, *Moisture stress, Succinate, Zea mays M.

Mitochondria were isolated from etiolated corn shoots (Zea mays L.) that were stressed to a measured water potential. The rates of mitochondrial respiration in state III, state IV, and without phosphate or ADP on a mg protein basis decreased as water stress increased with succinate, malatepyruvate, or reduced NAD as substrates. Coupling (as determined by respiratory control and ADP/O ratios) did not decrease with increasing water stress. At water potentials greater than -35 bars all respiration had ceased.--Copyright 1972, Biological Abstracts, Inc.
W72-11255

IRRIGATION AND ITS EFFECTS ON PRODUCTION,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
D. S. Rickard.
New Zealand Journal of Agriculture, Vol 124, p 18, January 1972. 2 fig.

Descriptors: *Irrigation, *Irrigation effects, *Pastures, *Crop response, Foreign countries, Soil properties, Grasses, Data collections, Perennial ryegrass, White clover, Crop production, Irrigation practices, Soil-water-plant relationships.
Identifiers: *New Zealand, Winchmore Irrigation Research Station.

The effect of dry soil conditions on pasture production and the results obtained with irrigation at Winchmore, New Zealand are presented. Production, in lb dry matter per acre, was measured at Winchmore over a 16-year period from both nonirrigated pasture and from pastures receiving a variety of irrigation treatments. Over this period the average rainfall from September to May was 23.4 inches, ranging from 17.09 inches in 1963-64 to 38.12 inches in 1952-53. The average production of the nonirrigated pasture (which is predominantly perennial ryegrass and subterranean clover) was 5400 lb dry matter/acre. Over the same period, a well-irrigated pasture (predominantly perennial ryegrass and white clover) gave an average yield of 10,600 lb dry matter/acre. (Woodard-USGS)
W72-11299

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, CATRON COUNTY,
New Mexico State Univ., University Park, Dept. of Agronomy.
For primary bibliographic entry see Field 02G.
W72-11311

THE EFFECT OF THE SUBSTRATE MOISTURE CONTENT ON THE GERMINATIVE CAPACITY OF BEECH SEEDS,
B. B. Mirzoev.
Tr Azerb Nauchno-Issled Inst Lesn Khoz Agrolesomelior, Vol 8, p 106-109. 1968.
Identifiers: Beech D, *Germination, Humidity, Litter, *Moisture content, Seeds, Substrates, *Soil-water-plant relationships.

The best conditions for germination are found at a litter humidity of 60-70% of its maximum water holding capacity and at 50-60% soil moisture. With the reduction of the substrate moisture, seedlings begin to appear later and on more widely scattered dates.--Copyright 1972, Biological Abstracts, Inc.
W72-11336

WATER REGIME OF SOIL UNDER PROLONGED IRRIGATION AND FERTILIZATION,
R. M. Khachetlov.
Uch Zap Kabard-Balkar Univ. 41. p 83-85. 1969.
Identifiers: *Fertilization, *Irrigation, *Calcareous soils, Soil moisture, *Chernozems.

The productive moisture content in the upper 1-m layer of calcareous chernozems exceeded 140 mm throughout the growing season with prolonged irrigation, but was only 60 mm, decreasing to zero toward the end of the growing season, without irrigation. Data are given of determinations of productive moisture in soils.--Copyright 1972, Biological Abstracts, Inc.
W72-11338

NUTRIENT REGIME OF CALCAREOUS CHERNOZEMS UNDER PROLONGED IRRIGATION AND MANURING,
R. M. Khachetlov.
Uch Zap Kabard-Balkar Univ. Vol 41. p 80-82. 1969.
Identifiers: *Chernozems, *Irrigation, *Manuring, Nutrients, *Calcareous soils.

The investigations were carried out in 2 10-field rotations, with and without irrigation. Results of studies made of the nitrates, phosphates and exchangeable K in the soil are presented.--Copyright 1972, Biological Abstracts, Inc.
W72-11340

THE EFFECT OF TIME AND RATE OF N APPLICATION ON THE PRODUCTIVITY OF GRASS SWARDS IN TWO ENVIRONMENTS,
North Wyke Experiment Station (England).
K. M. Wolton, J. S. Brockman, and P. G. Shaw.
J Br Grassl Soc. Vol 26, No 3, p 123-131. 1971. Illus.

Identifiers: *Application methods, *Crop response, *Fertilization, Dry matter, England, Environment, Grass M, *Nitrogen, Productivity, Rainfall, Rates, Rye, Sunshine, Swards, Time.

Six identical experiments (3 in Devon and 3 in Suffolk) investigated the effect of 200, 300 and 400 lb N/ac (224, 336 and 448 kg/ha), given in 1, 2, 4 or 8 equal applications, on the yield and seasonal production of perennial ryegrass swards cut every 25 days. Each rate of N increased DM (dry matter) and N yields. Giving the N in 4 or 8 dressings gave higher DM, but rather lower N yields, than applying the N in 1 or 2 dressings. The effect on DM yield of splitting the N was most marked at 400 lb N/ac (488 kg/ha). Seasonal production was closely related to the time of N application and most uniform where N was given in 8 dressings. Differences between Devon and Suffolk were most evident where the N was given in 4 or 8 dressings and occurred in the 2nd half of the season when the low rainfall in Suffolk apparently restricted N uptake and DM yield. The efficiency with which N taken up by the plant was used for DM production was affected by sunshine. It is concluded that rainfall and sunshine will limit the extent to which fertilizer N can be used to control herbage production.--Copyright 1972, Biological Abstracts, Inc.
W72-11347

WASTEWATER MANAGEMENT PROJECT MUSKEGON COUNTY, MICHIGAN,
Illinois Univ., Chicago. Center for Urban Studies.
G. W. Davis, and A. Dunham.
Available from the National Technical Information Service as PB-208 310, $6.00 in paper copy, $0.95 in microfiche. National Water Commission Report SBS-72-038, Nov. 1971, 322 p. Contract NWC 71-006.

Descriptors: *Sewage disposal, *Waste disposal, *Irrigation systems, *Waste treatment.
Identifiers: *Waste water management, *Institutional arrangements, *Muskegon County (Mich), Regional planning, *Spray irrigation.

A case study is presented of the regional planning effort which led to the adoption of a spray irrigation system for wastewater management in Muskegon County, Michigan. A general overview of the problems encountered by Muskegon County is given and the past exploitation of the environmental resources and the degradation which had taken place are described. Earlier attempts to provide areawide water resource management are described, and the recommended solution is explained, together with the steps leading to its implementation, which is now under way. The reasons for the success of the effort are analyzed, and factors which could prove useful to other communities in attempting to execute regional water management projects are outlined. It will be five, six or more years before the success of the wastewater management system can be evaluated. Appendices by David H. Walborn and Thomas Vitullo-Martin provide back-up. (NWC)
W72-11381

THE HYDRAULICS OF SPATIALLY VARIED FLOW IN AN IRRIGATION DISTRIBUTION CHANNEL WITH FURROW OUTLETS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
J. E. Garton, J. M. Sweeten, V. W. Uhl, Jr., and J. H. Edwards.
Available from the National Technical Information Service as PB-210 917, $3.00 in paper copy, $0.95 in microfiche. Completion Report (1971), 65 p. OWRR A-015-OKLA (5).

Descriptors: *Energy equation, *Hydraulic design, *Flow resistance, *Discharge, *Channel flow, Hydraulic properties, Mannings equation, Irrigation canals.
Identifiers: *Irrigation distribution channels.

This project consisted of three phases; I. The hydraulics of a concrete lined trapezoidal channel with rectangular side weir outlets; II. The hydraulics of a semi-portable sheet metal flume with circular outlets, and III. Field tests of a semi-portable sheet metal flume with circular outlets. For Phase I, discharge relationships were determined for different sizes of rectangular weirs with 45 deg slope. The channel hydraulic properties were defined and a method derived for directly computing water surface profiles. The variations in individual furrow discharge resulting from various flow, depths, weir spacing and size were determined. For phase II, a galvanized sheet metal flume was designed for structural stability and hydraulic efficiency. This flume was tested in the outdoor Hydraulic Laboratory to determine the Manning's roughness coefficients for spatially varied flow. Tests were run on circular orifices with full flow and with weir flow. Uniformity of discharge was determined for a two bay system. For phase III, the sheet metal flume design was revised, 710 feet of channel was built, and two years of field tests were conducted to determine its performance under field conditions. The stability tests of the system indicate a need for improved supports.
W72-11384

GROWTH RESPONSE OF CORN TO CHANGES IN ROOT TEMPERATURE AND SOIL WATER SUCTION MEASURED WITH AN LVDT,
Oregon State Univ., Corvallis.
E. W. R. Barlow, and L. Boersma.
Crop Science, Vol 12, p 251-252, March-April 1972. OWRR B-009-ORE (4).

Descriptors: *Temperature, *Soil temperature, *Heat flow, *Crop response, Corn (Field), Moisture stress, Soil-water-plant relationships.

The rate of corn (Zea mays L.) leaf elongation was continuously monitored with a Linear Variable Differential Transducer (LVDT) which accurately measures the rapid changes in leaf elongation rate that occur after a plant is released from stress. Short-term measurements of leaf elongation rate at varying root temperatures gave qualitatively similar results to those obtained by other workers in long-term experiments. The leaf elongation rate increased rapidly when plant roots were released from low temperature or water stress. The maximum leaf elongation rate achieved after the release from stress was higher than the maximum rate of unstressed plants.
W72-11388

INFLUENCE OF THE VOLUME OF WATER APPLICATIONS ON GROWTH AND DEVELOPMENT OF SPRINKLER IRRIGATED MAIZE, (IN BULGARIAN),
Institute of Water Engineering and Land Improvement, Sofia (Bulgaria).
J. Delibaltov.
Rastnivod Nauki. Vol 8, No 3, p 17-30, 1971, Illus. English summary.
Identifiers: *Crop response, *Rates of application, Bulgaria, Grains, *Irrigation, Maize M, Moisture, Protein, Quantity, Roots, Soil, Sprinkler irrigation, Volume.

Experiments were conducted in order to establish the influence of the volume of water application on growth, development, quantity and quality of yield of sprinkler irrigated maize grown for grain. The experiment was planted in a Latin square design with 4 replications on cinnamon forest soils, using the cultivar 'Wisconsin 641 AA' at a rate of 4080 and 5100 plants per 0.190 ha (70 x 28 and 70 x 35 cm). Eight treatments were tested at 2 preirrigation moistures of the active soil layer. In 3 of the treatments in which maize was grown at preirrigation moisture of 85-85-70% of the field capacity, the volume of the water application was 23.5, 40 and 56.4 m3/0.10 ha, respectively, and in 2 of the treatments using the same preirrigation moisture, the mean volume of water applications was 35.8 and 43.5 m3/0.10 ha. Preirrigation moisture in the other 3 treatments was 70-75-70% of field capacity, the volume of the applications was 34.0, 55.0 and 74.3 m3/0.10 ha. Sprinkler irrigation of maize at different volumes of water application affected plant growth and development. Plants grown at preirrigation moisture of 85-85-70% of field capacity and volume of water application of 23.5 and 40 m3/0.10 ha developed best. Yield slightly decreased with the increase in the volume of water application to 56.4 m3/0.10 ha. When preirrigation moisture was maintained at 70-75-70% of the field capacity and the volume of water applications was kept at 34, 55 and 74.3 m3/0.10 ha, the yields were slightly lower, compared with those obtained at the higher preirrigation moisture, but they showed the same trend. Root system volume and weight of plans grown at higher preirrigation moisture were greater compared with those of plants grown at 70-75-70% of field capacity. Largest quantity of roots were formed in the soil layer of 0-30 cm. The root system was smallest for both preirrigation moistures in the active soil layer (top 30 cm). Sprinkler irrigation of maize at various volumes of water application affected grain quality. There existed a tendency toward increased crude protein and fats with an increase in the volumes of water application and in the number of plants per 0.10 ha. Yields in nearly all treatments rose with the increase in the number of plants from 4080 tp 5100 per 0.10 ha. This was largely due to the greater number of ears per unit of area. The number of applications for the different treatments varied on the average for the period from 4 to 8 at preirrigation moisture of 85-85-70% of the field capacity and from 3 to 6 for preirrigation moisture of 70-75-70% of the field capacity and amount of water applications-from 23.5 to 56.4 and from 34 to 74.3 m3/0.10 ha at the same volume of irrigation requirement.--Copyright 1972, Biological Abstracts, Inc.
W72-11427

ACCURACY OF MEASURING EVAPORATION FROM SOIL SURFACES USING SMALL EVAPORATION PANS (O TOCHNOSTI NABLYUDENIY ZA ISPARENIYEM S POVERKHNOSTI POCHVY PO MIKROISPARITELYAM),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02D.
W72-11457

EFFECT OF TWO NONIONIC SURFACTANTS ON PENETRABILITY AND DIFFUSIVITY OF SOILS,
California Univ., Riverside.
For primary bibliographic entry see Field 02G.
W72-11658

IMMEDIATE AND SUBSEQUENT GROWTH RESPONSES OF MAIZE LEAVES TO CHANGES IN WATER STATUS,
Chile Univ., Santiago. Dept. of Agriculture.
E. Acevedo, T. C. Hsiao, and D. W. Henderson.
Plant Physiol. Vol 48, No 5, p 631-636. 1971. Illus.
Identifiers: Assimilation, Carbon, Cells, Elongation, *Growth rate, Leaves, *Maize-M, Oxide, Stress, Water, *Zea-Mays-M.

Elongation of intact young leaves of maize (Zea mays) was found to be dynamically dependent on soil water supply. With adequate water, elongation was remarkably constant but slowed when the water potential of the soil in pots dropped from -0.1 to -0.2 bar and stopped when it dropped to -2.5 bars. The corresponding range of leaf water potential was -2.8 to -7 bars. Elongation resumed in less than a few sec. after a mildly water-stressed plant was rewatered. The effects on leaf elongation of step-wise changes in water potential of the root solution were determined. When the water potential of the root medium suddenly decreased below 0 bar, growth stopped initially and then resumed at

a lower rate. When the water potential was suddenly increased back to 0 bar, growth accelerated transitorily to a high rate before slowing to the steady state rate. These results suggest an increase in cell extensibility during water stress. Leaves stressed for 1 or more days attained after rewatering almost the length of the control leaves. Growth rate after rewatering did not exceed that of the control at the corresponding developmental state except during the short transitory rapid phase lasting only a fraction of an hour. As stress developed, growth stopped before CO2 assimilation decreased noticeably. Upon the release of mild and short stress, the transitory rapid growth completely made up for the reduced elongation during stress, suggesting that metabolic processes for cell expansion might have proceeded unchecked during the stress period. The sensitivity and rapidity of response to changes in water status all point to the direct role of water in growth; its uptake provides the physical force for cell enlargement.--Copyright 1972, Biological Abstracts, Inc.
W72-11685

DEHYDRATION, WATER FLUXES, AND PERMEABILITY OF TOBACCO LEAF TISSUE,
Negev Inst. for Arid Zone Research, Beersheba (Israel).
Y. Graziani, and A. Livne.
Plant Physiol. Vol 48, No 5, p 575-579. 1971. Illus.
Identifiers: Absorption, Age, *Dehydration, Efflux, Energy, Epidermis, Fluxes, Hydration, Ion, Leaf, Lower, *Nicotiana-Rustica-D, *Permeability, Photosynthesis, Tissue, *Tobacco-D.

Removal of the lower epidermis from a tobacco (Nicotiana rustica) leaf allows a faster and wider range of water fluxes, without damaging the mesophyll. It also permits a more direct examination of the photosynthetic potential of the tissue at various levels of hydration. The rehydration rate of leaf discs is essentially linear. It decreases with leaf age and is correlated with the rate of dehydration, but it is independent of the tissue's water potential, as estimated by the isopiestic method. The hydraulic permeability coefficient of water influx is directly related to water potential of the tissue, suggesting a mechanism for the regulation of the hydration level of the leaf tissue. The 'energy of activation' of rehydration amounts to about 9 kcal/ml at intermediate dehydration, but it greatly declines following water loss in excess of 600 mg/g fresh weight. The excessive dehydration is also characterized by a major increase in permeability (monitored by efflux of ions and materials absorbing UV light) and by a parallel decrease in photosynthetic activity. The interrelationship of these effects of excessive dehydration is discussed.--Copyright 1972, Biological Abstracts, Inc.
W72-11686

EFFECT OF SOIL DROUGHT, MICROELEMENTS AND PHOSPHORUS ON THE PHYSIOLOGICAL ASPECTS OF CASTOR--BEAN DEVELOPMENT,
Gosudarstvennyi Pedagogicheskii Institut, Rostov-na-Donu (USSR).
F. V. Shatilov, and L. M. Kudinova.
Fiziol Rast. Vol 17, No 6, p 1147-1151. 1970. English summary.
Identifiers: *Castor-Bean-D, *Drought, *Microelements, Fruit, Growth, Oil, Organogenesis, *Phosphorus, Photosynthesis, Pollen, Soils, Vitality.

The effect of drought during different stages of organogenesis as well as of foliar application of microelements and P on the intensity of photosynthesis, growth and crop was studied in castor-bean plants. The effect of drought during the VI-IX stages of organogenesis inhibited the growth processes, the intensity of photosynthesis and the vitality of pollen, during the IX-XII stages of organogenesis, reduced the period of fruit formation and during the IX-XI stages, decreased the oil percentage of seeds. Foliar application of microelements and P diminished the depressing effect of drought on the plant vital processes and increased the vitality of pollen and the oil percentage of seeds. The period within the VI-X stages of organogenesis is concluded to be the most sensitive one with regard to soil drought.--Copyright 1972, Biological Abstracts, Inc.
W72-11688

WHEAT YIELDS AND CHANGE IN CATIONS AFTER LEACHING SOIL WITH WATER CONTAINING INCREASING RATES OF POTASSIUM REFINERY DUST,
Saskatchewan Univ., Saskatoon. Dept. of Soil Science.
A. K. Ballantyne.
Can J Soil Sci. Vol 51, No 3, p 405-410. 1971. Illus.
Identifiers: *Cations, Dolomite, Fertilizer, *Leaching, *Potassium, Refinery dust, Soils, *Wheat-M yields.

Leaching a silt loam soil (cation exchange capacity 23 meq/100 g) with water containing increasing rates of K dust (KCl) indicated that high levels adversely affected germination and yields of wheat as well as response to fertilizer. Germination was greatly reduced by the treatment with 22.4 metric tons/ha and nearly eliminated by 44.8 tons. The 44.8-ton/ha treatment also greatly reduced the yield of grain, but straw weights were affected very little by increasing rates of potassium dust. Response to fertilizer was also reduced by 22.4 and 44.8 tons. The exchangeable Ca and Mg decreased and K increased as increasing amounts of K dust were leached through the soil. The 44.8-ton treatment decreased the exchangeable Ca from 56.0 to 24.9% and the Mg from 21.2-4.9%, and increased the K from 7.2-51.9%. K salts can probably be added to the soil, without any adverse effects, until the exchangeable K is increased to about 30%. With the Soil under study this took more than 11.2 tons/ha (5 short tons/acre). The applications of dolomite ameliorated the effect of excess K.--Copyright 1972, Biological Abstracts, Inc.
W72-11693

RELATIVE EFFICIENCY OF NITROGEN FERTILIZERS FOR 'GANGA 101' MAIZE (ZEA MAYS L.) AS INFLUENCED BY RAINFALL,
Indian Agricultural Research Inst., New Delhi.
R. Prasad, and B. B. Trukhede.
Indian J Agric Sci, Vol 41, No 5, p 485-489. 1971. Illus.
Identifiers: Ammonium, Calcium, Chloro-6-Trichloromethyl, *Fertilizers, Ganga 101, Maize-M, Nitrates, *Nitrogen fertilizers, Pyridine, Rainfall, Sodium, Sulfates, Urea, *Zea-Mays-M.

Ammonium sulfate, calcium ammonium nitrate, urea and sodium nitrate were equally effective in the relatively dry year 1965, but in the wet year 1967 ammonium sulfate was the best source, followed by urea, calcium ammonium nitrate and sodium nitrate-urea and calcium ammonium nitrate being equally effective. In 1967, 2-chloro-6 (trichloromethyl) pyridine treatment of N fertilizers was beneficial when the leaching losses of applied N were heavy.--Copyright 1972, Biological Abstracts, Inc.
W72-11694

EFFECT OF TIME AND DEPTH OF NITROGEN APPLICATION ON GROWTH AND YIELD OF RICE,
Institute of Agricultural Sciences, Hanoi (North Vietnam).
Van Uyen Nguyen.
Acta Agron Acad Sci Hung. Vol 20, No 3/4, p 311-317. 1971.
Identifiers: Depth, Growth, *Nitrogen, *Rice-M, *Yield, Soils.

The N requirement of the rice plant has a continuous character. Deep placement of N, besides preventing effect on the loss of N from waterlogged-soil following Pearsall-Mitsui mechanism, also satisfies the N requirement of the rice plant in the later phase of growth. A 20-25% increase in yield was obtained as compared to the shallow surface placement method.--Copyright 1972, Biological Abstracts, Inc.
W72-11695

WATER, THERMAL AND AIR REGIME OF SOIL IN A PICEETUM OXALIDOSUM FOREST AND UNDER CROPS,
K. Roostalu, R. Tupits, and M. Tsirk.
Sb Nauchn Tr Est S-Kh Akad. 65. 291-314. 1970. English summary.
Identifiers: Air, *Crops, Forests, Grain, Piceetum-Oxalidosum, Potato-D, Regime, *Soils, Thermal, *Soil moisture.

The moisture content of pseudopodzolic soil is somewhat higher under Piceetum oxalidosum than in plowland. The latter suffers from lack of moisture in dry months, especially under grain crops. Evapotranspiration decreases considerably under grain crops during drought. Moisture conditions are better for potato, which requires more water at a later date than the grain crops. Moisture deficiency under forest occurs in Sept. The warming and cooling of the deeper horizons of forest soil are considerably slower than in the plowland. The CO2 concentration in the air of forest soils rarely exceeds 0.4% throughout the growing season, and is higher in plowlands, sometimes even exceeding 1.5%. The more intensive release of CO2 by soils occurs during the development of vegetation and vigorous microbiological activity in May-June and in Aug., when the decomposition of fresh organic matter begins. Maximum respiration under potatoes occurs at a later date than under grain crops.--Copyright 1972, Biological Abstracts, Inc.
W72-11697

EFFECT OF THE CROP DENSITY ON THE GROWTH, DEVELOPMENT AND YIELD OF IRRIGATED MAIZE IN THE REGION OF THE SOUTH BULGARIAN CHERNOZEM SMOLNITZA SOILS,
Academy of Agricultural Sciences, Chirpan (Bulgaria). Inst. of Cotton.
G. Nikolov.
Rastenievod Nauki, Vol 7, No 9, p 69-81, 1970, Illus, English summary.
Identifiers: *Crop density, Bulgaria, Chernozem, *Crop response, Development, Growth, Irrigation, Maize-M, Smolnitza, Soils.

Five crop densities were tested in field experiments (32,000, 38,000, 44,000, 50,000 and 58,000 plants/ha), as were 2 interrow spaces, 70 and 90 cm, and 2 levels of fertilization N10P8K4 and N20P16K8. The leaf area increased with the crop density and the level of the mineral fertilization. The photosynthetic potential increased, as a result of which the biologic and economic yield also increased. The reduced nutritive area at increased crop densities decreased the weight of the root mass of individual plants but the total root weight/ha increased considerably due to the larger number of plants, since the roots mass increased at the expense of the soil layer from 0-50 cm. Due to better developed photosynthetic and root system potentials, the best yield of late maize varieties of the 'Kansas 1859' type is 44,000 plant/ha and the fertilization level N10P8K4 and 44,000-50,000 plants/ha and N20P16K8. Maize responds more actively to the increased number of plants/ha at a higher level of fertilization as the yield increases by 14-16%, while at low level of fertilization as a result of the increased number of plants the yield increases by 7.3-9%. The interaction between crop density and fertilization was strongly manifested. One way differences between the 2 interrow spaces, 70 and 90 cm, were not observed both in the growth and development of the plants and in the grain yield.--Copyright 1972, Biological Abstracts, Inc.
W72-11717

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

METHODS FOR EFFECTIVE RECLAMATION OF SALINE CALCAREOUS PEAT SOILS IN THE UKRAINE (PRIYEMY EFFEKTIVNOGO OSVOYENIYA ZASOLENNYKH KARBONATNYKH TORFYANYKH POCHV USSR),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11126

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W72-11173

GREAT LAKES CONNECTING CHANNELS, WIDENING AND DEEPENING BENDS IN ST. MARY'S RIVER, MICHIGAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.

Available from the National Technical Information Service as PB-199 855D, $3.00 in paper copy, $0.95 in microfiche. May 1971. 17 p, 1 illus.

Descriptors: *Environmental effects, *Great Lakes, *Michigan, *Channel improvement, Navigable waters, Navigation, Ships, Safety factors, Spoil banks, Dredging, Turbidity, Silts, Fishkill, Recreation, Aquatic environment, Explosions, Nutrient removal.
Identifiers: *Environmental impact statments, St. Mary's River (Mich).

Project plans call for widening six channel bends on the St. Mary's River in Chippewa County, Michigan, to accomodate larger vessels. The project would include a spoil disposal island which would cover about six acres of river bottom. Dredging operations will cause temporary increases in turbidity and siltation. Fish kills and nutrient releases may occur during blasting and dredging. Recreational activities would be disrupted in the immediate work areas for the duration of the project. The alternative of 'no improvement' would not alleviate potential safety hazards to large ships. Alternate disposal sites were investigated, but were rejected as too costly or environmentally undesirable. (Waldron-Florida)
W72-11175

SMITHVILLE LAKE, LITTLE PLATTE RIVER, MISSOURI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08D.
W72-11177

OCONTO HARBOR, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 08A.
W72-11179

DETAILED PROJECT STUDY OF FLOOD CONTROL IMPROVEMENTS FOR WAIMANO STREAM, OAHU, HAWAII (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 08F.
W72-11182

CEDAR BAYOU, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from the National Technical Information Service as PB-198 855D, $3.00 in paper copy, $0.95 in microfiche. February 1971. 10 p.

Descriptors: *Texas, *Environmental effects, *Channel improvement, *Dredging, Stream improvement, Water management (Applied), Hydraulics, Multiple-purpose projects, Excavation, Navigation, Marshes, Wildlife habitats, Disposal, Spoil banks, Ships, Streams.
Identifiers: *Environmental impact statements.

The project would consist of constructing a navigation channel in Cedar Bayou, Texas, including minor bend easings, and relocating an 0.8 mile section of the existing channel to improve the navigation alignment from the bay into the mouth of the bayou. Except for the bend easings, the proposed alignment in Cedar Bayou essentially follows the natural stream channel and most of the excavation would be from the stream bed. The total amount of material to be excavated by hydraulic dredging is estimated to be about 580,000 cubic yards. The improved channel will effect savings in transportation costs and reduce the probability of marine accidents. Dredging operations and disposal of excavated materials will cause temporary increases in turbidity in the bay section of the project. A small acreage of marsh habitat will be excavated, and spoil deposition will cover some wildlife habitat in the inland section. The only available alternative is to forego improvement of the stream, and to perpetuate the hazardous and restrictive conditions affecting existing navigation. The only irreversible and irretrievable commitments of resources would be a loss of ecologically valuable marshland and the labor and material resources associated with construction. (Widman-Florida)
W72-11183

CHOCTAWHATCHEE RIVER AND HOLMES CREEK, FLORIDA-PERMIT APPLICATION FOR SNAG REMOVAL BY FLORIDA GAME AND FRESH WATER FISH COMMISSION (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.

Available from the National Technical Information Service as PB-203 770-D, $3.00 in paper copy, $0.95 in microfiche. October 1971. 30 p, 1 map, 1 tab.

Descriptors: *Alabama, *Florida, *Environmental effects, *Channel improvement, Administration, Multiple-purpose projects, Project planning, Water management (Applied), Water law, Boating, Non-consumptive use, Recreation facilities, Recreation, Aquatic habitats, River regulation, River flow, Turbidity, Navigation.
Identifiers: *Environmental Impact Statements.

The project will remove snags and stumps from the Choctawhatchee River and Holmes Creek. The snagging would be accomplished from the mouth of the Choctawhatchee to the Alabama state line, and on Holmes Creek from Vernon, Florida, to the confluence with the Choctawhatchee River. The project would clear a 30-foot channel by using chain saws, pneumatic saws, winches, other light equipment, and a limited use of dynamite. The objective is safe navigation for small pleasure boats. Environmental impacts will include a reduction of aquatic habits for invertebrates and algae and an increase in opportunity for safe usage of the resource for boating, fishing and general recreation. Adverse environmental effects include a reduction of aquatic habitat, temporary increase in turbidity, and insignificant effects on biota. Alternatives are use of larger equipment and no action. The energy expended as manpower and fossil fuels in implementing and maintaining the project will be irretrievable. (Widman-Florida)
W72-11194

BENEFIT-ACCURACY RELATIONSHIP FOR SMALL STRUCTURE DESIGN FLOODS,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W72-11215

SYSTEMS ANALYSIS OF THE PANAMA CANAL WATER SUPPLY,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
D. C. Lewis, and L. R. Beard.
Water Resources Research, Vol. 8, No. 3, p 769-773, June, 1972. 3 fig.

Descriptors: *Panama Canal, *Water supply, *Water requirements, *Optimum development plans, Simulation analysis, Economic analysis, Potential water supply, Water storage, Municipal water, Lakes, Reservoirs, Runoff, Pumping, Water conveyance, Operations research.
Identifiers: Supplemental water supply, Gatun Lake, Madden Lake, Gaillard cut, Power plants, Capacities, Power generation, Lockage water, Evaporation loss, Shipping.

Simulation analysis is employed to represent Panama Canal operation and to evaluate economically the existing and potential supplemental water supplies at ever increasing levels of shipping. The ultimate planning goal is to implement the most efficient canal operating policies to obtain the maximum revenue minus the costs of supplemental water for lockage. The study purposes are to determine the most effective way to operate the canal for different levels of projected traffic and different depths of supply water and to develop optimum operation rule curves for generating power and pumping water to increase lockage water supply. The simulated canal operation is based on the assumption of a repeat of historical runoff to determine the optimal operation for existing and potentially deeper channels. Inputs into the model consist of the monthly runoff into two major reservoirs corrected for evaporation losses, average daily lockage rate, and the stochastic fluctuation of each month's lockage rate from the average for the entire 54 years of historical operation. For simplification, the dominant factors are examined as to their impact on the operation, and operation rule curves are derived by studying critical periods of water shortage and successively adjusting rule curves to maximize benefits subject to constraints. (See also W72-11224) (Bell-Cornell)
W72-11223

SYSTEM RELATIONSHIPS FOR A PANAMA CANAL WATER SUPPLY STUDY,
Atomic Energy Commission, Washington, D.C.
L. G. Hulman.
Water Resources Research, Vol. 8, No. 3, p 774-778, June, 1972. 3 fig, 1 ref.

Descriptors: *Panama Canal, *Water supply, *Water requirements, *Optimum development plans, Simulation analysis, Operations research, Economic analysis, Water storage, Lakes, Reservoirs, Runoff, Municipal water, Pumping, Water conveyance, Power plants.
Identifiers: Hydropower, Shipping revenues, Lockage water, Supplemental water supply.

The Panama Canal and its operational characteristics are described and a detailed summary is presented of the system relationships. Increased shipping through the canal has begun to tax the capability of the water supply system to provide lockage water. Since January, 1914, ship passage through the canal has grown from an average of less than one ship per day to a maximum of 39 per day in 1968. To investigate the use of existing and supplemental water supplies, the operation of the canal is simulated by using detailed data on the water used during ship transits, the storage capability of the reservoir system serving the canal, the hydropower capability of each reservoir, the operating constraints for shipping, the anticipated municipal water supply diversion, the historical

shipping use, the economics of shipping, the hydropower production, and the supplemental water supplies. Canal operation for different operation criteria and different shipping levels is used with chronological runoff data for simulation. Two major undertakings are considered for providing additional lockage water: (1) deepening the Gaillard Cut channel to increase the range of operating storage in a principal reservoir, Gatun Lake; and (2) providing pumps below Gatun Lake to allow recirculation of lockage releases. (See also W72-11223) (Bell-Cornell)
W72-11224

INLAND WATERWAY FROM DELAWARE RIVER TO CHESAPEAKE BAY, DELAWARE AND MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.

Available from the National Technical Information Service as PB-202 586D, $3.00 in paper copy, $0.95 in microfiche. September 15, 1971. 28 p, 18 tab.

Descriptors: *Chesapeake Bay, *Maryland, *Canals, *Environmental effects, *Dredging, Channel improvements, Multiple-purpose projects, Water management (Applied), Planning, Comprehensive planning, Environmental engineering, Administrative agencies, Coordination, Navigation, Project benefits, Bridges, Railroads, Highways.
Identifiers: *Environmental Impact Statements.

The project will provide for widening and deepening the existing waterway and includes reconstruction of existing highway and railroad bridges. Work on the project has been in progress for a number of years and is currently approximately 85% completed. The project is located in New Castle County, Delaware, and Cecil County, Maryland. This project will provide safer passage for marine traffic. Recreational facilities will be provided. The increased net flow could produce ecological ramifications in Chesapeake Bay and the canal. A three year study has been started to determine the impact and produce suggestions for mitigating any adverse ecological conditions resultant from the widening and deepening of the canal. Adverse environmental effects resulting from the widening and deepening cannot be determined until the ecological study is completed. If adverse biological effects are encountered, flow controlling devices could be installed to mitigate the environmental stress resulting from too great a net flow from Chesapeake Bay. The alternatives of no project or temporary suspension of dredging are not considered feasible. (Widman-Florida)
W72-11260

VANDALIA DRAINAGE AND LEVEE DISTRICT (DISTRICT 21), ILLINOIS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 08D.
W72-11263

NAHUNTA SWAMP BASIN, WAYNE AND GREENE COUNTIES, NORTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 08A.
W72-11267

SCAPPOOSE DRAINAGE DISTRICT, OREGON, PROPOSED IMPROVEMENTS, FLOOD PROTECTION (DRAFT ENVIRONMENTAL IMPAC STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08A.
W72-11268

CALCULATION OF EXPECTED VALUES OF OBSERVABLES IN SOME PROBLEMS OF STATISTICAL GEOMORPHOLOGY,
Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
For primary bibliographic entry see Field 02A.
W72-11294

SOME THOUGHTS ON ESTIMATING SPILLWAY DESIGN FLOOD,
Resources Research Centre, Ottawa (Ontario).
For primary bibliographic entry see Field 02A.
W72-11295

A GEOGRAPHIC ANALYSIS OF HYDROLOGIC RESPONSE IN THE SOUTHEASTERN UNITED STATES,
Franklin Coll. of Arts and Sciences, Athens, Ga. School of Forest Resources.
For primary bibliographic entry see Field 02A.
W72-11312

DRAINAGE TILE LOCATION USING AERIAL PHOTOGRAPHY,
Army Topographic Command, Washington, D.C.; and Ohio State Univ., Columbus.
A. E. Krusinger, G. O. Schwab, and O. W. Mintzer.
Paper 71-178, 1971 Winter Meeting American Society of Agricultural Engineers, Chicago, Ill., Dec 1971. 6 p, 3 ref.

Descriptors: *Subsurface drains, *Aerial photography, *Photogrammetry, Locating, Surfaces, Effects, Detection.
Identifiers: Aerial interpretation, Color film, Photointerpretation, Infrared photography, Color photography.

Locating underground drainage tile is extremely difficult, particularly when records are scarce, sketchy, or nonexistent. A study on 3 test locations in Ohio ascertained whether 35 mm aerial photography could be used. Locating subsurface draintile involves recognizing surface effects of the drain. Most obvious is soil drying, which produces a lighter tone than surrounding soil in early spring, when the land is bare and rainfall is plentiful. Tests indicated that aerial photography may be the best method for locating tile. The 35 mm photography produced good images of the tile line surface effects and correlated with tile maps, owner sketches, and physical probing. The optimum film is color infrared; color film is a close second choice. To ensure against unacceptable imagery, panchromatic film should be used in conjunction with color infrared or color film. Infrared black and white film is inferior to the other 3 films considered. (USBR)
W72-11374

DRAIN SYSTEM DESIGN FOR MAINTENANCE,
Soil Conservation Service, El Centro, Calif.
P. K. Koluvek, and W. Simpson.
Paper 71-719, 1971 Winter Meeting, American Society of Agricultural Engineers, Chicago, Ill., Dec 1971. 10 p, 7 fig.

Descriptors: *Drainage systems, *Maintenance, *Subsurface drains, *Structures, *Observation wells, Drainage engineering, Drains, Tile drains, Drainage wells, Installation costs, Cleaning, Manholes.
Identifiers: Flushing.

The function of tile drains is adversely affected by siltation, plugging, and sealing of the joints; therefore, the drainage system design should include observation and maintenance structures. Several types of structures have been developed for these purposes. Tile inspection wells located at various points in the system can be used to observe flow conditions in the tile lines. When placed at the upstream end of a lateral, the wells can be used to introduce water into a system to assure a given rate of flow. Similarly, wells at the downstream end of the system can be used to introduce water or chemicals for flushing or removal of dioxides. To eliminate the need for pumping or hauling water to a well, the end of the tile drainline should be located in an irrigation head ditch with a flush valve attached to the drain. When a farmer irrigates, water can be easily diverted into the line to flush the drain. Estimated costs, advantages, and disadvantages are given for the typical maintenance structures shown. (USBR)
W72-11376

DETERMINATION OF OPTIMUM STORAGE IN DISTRIBUTION SYSTEM DESIGN,
Dallas, City Water Utilities, Tex.
D. A. Brock.
Journal of the American Water Works Association, Vol. 55, No. 8, p. 1027-1037, August 1963, 2 fig, 4 tab, 5 ref.

Descriptors: *Storage capacity, *Reservoirs, *Distribution systems, Design, Storage, *Water storage, *Reservoir storage, Storage requirements, *Texas.
Identifiers: Peak hour demand, Ground storage, Elevated storage, In-system storage, Transmission mains, Replenishment, *Dallas (Tex).

Storage reservoirs in a distribution system provide operational aids in meeting peak-hour demands and emergency reserves needs. Storage provided is either within a pressure system or upstream of the system on the ground. In-system storage is generally elevated. Hydraulic and economic considerations govern the proportioning of storage to either ground or elevated storage. The cost of transmission mains is the only significant economic factor dictating in-system storage. From examining the Dallas water system, it was found that electric-power demand charges were not a factor in sizing the in-system elevated storage. A certain amount of elevated storage can always be justified because of its need in the operation of a pressure system. The determination of the capacities of all storage facilities is not complete until due consideration is given to the cycle of discharge and replenishment. (Andrew-AWWARF)
W72-11395

A MERIDIONAL GEOBOTANICAL PROFILE OF THE WESTERN ISSYK-KUL' FORELAND (IN THE BASINS OF THE TORU-AIGYR AND ULAKHOL RIVERS),
R. R. Krinitskaya, and N. D. Kozhevnikova.
Izv Kirg Geogr O-Va. 8. p 31-38. 1970.
Identifiers: Alpine, Altitude, Basins, Desert, *Issyk-Kul (USSR), Meadows, Rivers, Species, Steppe, Toru-Aigyr River, Ulakhol River, USSR, Zonation, *vertical zonality, *Geobotanical profiles.

In May and June, 1967, a study was made of the vertical zonality of a concrete meridional geobotanical profile through the southern slope Kungei-Ala-Too (I; in the basin of the Toru-Aigyr River) and the northern slope of the Terskei-Ala-Too (II; in the basin of the Ulakhol River). Three vegetation zones were distinguished in both mountain ranges: (1) desert (from the foothill talus slopes and the lacustrine belts to an absolute altitude of 2100-2200 m); 2) the steppe-intermediate mountain belt (from 2100-2200 to 2450-2500 m above sea level in II and up to 2700 m in I); 3) alpine pasture (from 2450-2700 to 3300-3600 m above sea level). The vegetation differs with respect to disposition with altitude, ratio of xerophilic and mesophilic associations, and species composition. The desert portions of II go up to an altitude of 2200 m; here the lower boundary of the steppe is 200 m lower than in I. In II the dry steppe is dominant throughout the entire zone, but in I the lower half of the zone is represented by deserts and only in the upper half by dry stepp. The greatest floristic and phytocoenotic differences are observed in the alpine meadow zone; this is caused

by temperature inversions in the Ulakhol River Valley. Turkestan juniper is completely lacking on both slopes.--Copyright 1972, Biological Abstracts, Inc.
W72-11402

MASS AND AGE STRUCTURE OF PICEA ABIES (L.) KARST NEEDLES UNDER DIFFERENT ECOLOGICAL AND PHYTOCENOLOGICAL CONDITIONS OF MONTE-NEGRO,
Akademiya Nauk USSR, Kiev. Instytut Botaniki.
M. A. Holubets', and L. I. Polovnikov.
Ukr Bot Zh. Vol 27 No 3 p 335-342. 1970. Illus. (English summary).
Identifiers: Age, Climate, Ecology, Elevation, Mass, *Montenegro, *Karst needles, Phytocenology, *Picea abies G, Structure.

The quantity, age composition and square of needles were investigated in fir phytocenoses in dependence on the type of the forest-growing conditions, height above sea level and stand age. Increases in elevation and moisture are correlated with increases in the total mass, needle square and needles/unit of stem wood mass. Increases in needle mass in the poorest types of forest are mainly a result of longer longevity. The weather conditions affect to a considerable degree the year increase of needle. The average square of a gram of absolutely dry needle in thick stands of the Carpathian fir is 133 + 1.6 cm sq and does not depend on ecological and community conditions, elevation or stand age.--Copyright 1972, Biological Abstracts, Inc.
W72-11407

THE ORIGIN AND DISTRIBUTION OF VALLEY GRASSLANDS IN EAST AFRICA,
D. F. Vesey-Fitzgerald.
J Ecol. Vol 58 No 1 p 51-75. 1970. Maps.
Identifiers: *Africa, Distribution, Drainage, Burning, *Grasslands, Nomadacris, Origin, Valleys.

The valley grasslands of the Congo and Zambezi drainage in East Africa are intrinsically related to the drainage. The grassland habitat has developed as an integral part of the plant catena during the course of the cyclic changes that have accompanied the erosion of the land surface. The occupying fauna has also become modified and adapted to the progressive changes that have occurred. More recently, and more obviously, devastating man-induced changes have influenced most natural habitats, and in East Africa have frequently degraded woody vegetation towards grasslands of a secondary nature. Natural grasslands are among the types of vegetation least affected by these changes, though their inherent productivity is often wasted owing to the depletion of the indigenous fauna and the consequent ravages of fire. Grasslands are among the most productive types of vegetation as demonstrated by the number and variety of animals dependent on them. The interrelationship between pasture and grazing animals can only be fully analyzed by taking cognizance of the effect that utilization has on the herbage. Hence the derivation of grasslands cannot be divorced from the effects of their occupation by animals. Compared with secondary habitats, relatively few genera and species occur in the natural grasslands of the drainage lines, but many of the associations are excellent indicators of the prevailing ecological conditions in different types of drainage. At the present time grassland is the most prominent type of vegetation in East Africa, and its expanse is increasing continually as a result of burning. The valley grassland communities are a natural type of vegetation of long establishment and they provide the essential habitat for a complex fauna that has shared their evolutionary history. This attribute is in striking contrast to that of fire-induced grasslands which are regarded as a degraded type of vegetation. A spectrum of interrelated but discrete types of valley grasslands is described which are primarily dependent on the drainage, but subject to modifications by climatic fluctuations and by biological pressure, the latter an important consideration. It is in such a seasonally varying and cyclically changing environment that a great variety and abundance of herbivorous animals have evolved and become adapted to the changing conditions. But occupation by man and his stock has been rendered difficult by the instability of the environment which suits the indigenous fauna. The same fluctuations cause the extreme population explosions and recessions of such 'annual' insects as the red locust (Nomadacris).--Copyright 1972, Biological Abstracts, Inc.
W72-11408

FOREST TYPES IN THE VARIOUS ALTITUDINAL AND CLIMATIC BELTS OF THE LESSER CAUCASUS,
P. P. Posokhov, and K. S. Asadov.
Tr Azerb Nauchno-Issled Inst Lesn Khoz Agrolesomelior. 8. p 49-56. 1968.
Identifiers: Altitude, Beech D, Birch D, Carpinus orientalis D, *Caucasus, Climate, Elm D, *Forests, Hornbeam D, Juniper G, Oak D, Pine G, Quercus iberica D, Soils, USSR.

Forest vegetation is found at 500-2300 m above sea level. The typological composition of forest is determined to a considerable degree by the climatic conditions. Very dry juniper forests on transitional, relatively poor soils (subor') and mixed forests on transitional, relatively fertile soils as well as dry juniper forests on fertile loamy soils are particularly characteristic of the dry belt of the reasonably warm climate (665-885 m); in the process of digression a very dry oak-Carpinus orientalis subor' is formed. In the fresh, lukewarm climatic belt (960-1200 m) are formed fresh Carpinus orientalis-oak forests on fertile soils and oak forests on transitional fertile soils with Quercus iberica, as well as dry hornbeam forests on fertile soils and oak-pine subor', in the wet moderate climatic belt, moist oak-hornbeam and hornbeam-beech forests are formed, as well as fresh hornbeam-oak forests and several other forest types. For the wet, reasonably moderate climatic belt (1560-1840 m), moist oak-hornbeam-beech forests are found, on the stony taluses, moist hornbeam-beech-pine subor' and moist pine forest. In the wet, cold climatic belt (1850-2150 m) moist oak-birch-subor' and hornbeam-elm-beech forests were found as well as other forest types.--Copyright 1972, Biological Abstracts, Inc.
W72-11413

MOLE DRAIN FAILURE DUE TO DRAWING MOLES DOWNHILL,
Foras Taluntais, Drumboylan (Ireland).
J. Mulqueen.
Ir J Agric Res. Vol 10, No 2, p 241-244. 1971. Illus.
Identifiers: *Drains, *Mole drainage, *Silting, Drainage, Subsurface drainage.

A mole drainage project, installed in mid-Oct. 1969, was examined in late Nov. 1970. Mole drains drawn downhill were found to be silted up along their length and partly or completely blocked. Mole drains drawn uphill were flowing, although some were point blocked. A tongue or plug of plastic soil drawn through the porous gravel of the collector drain was responsible for the silting up of the downhill moles.--Copyright 1972, Biological Abstracts, Inc.
W72-11418

LAND DRAINAGE SURVEY: III. MAPS OF IRELAND SHOWING THE GENERAL DISTRIBUTION OF DRAINAGE PROBLEMS AND OF DRAINAGE SCHEMES,
Foras Taluntais, Dublin (Ireland).
L. F. Galvin.
Ir J Agric Res. Vol 10, No 2, p 213-221. 1971. Maps.
Identifiers: Distribution, *Surface drainage, *Ireland, Land, Maps, Schemes, Survey.

Two maps, based on an analysis of the results of a 4-yr drainage survey were prepared. The Drainage Problem map shows the drainage problem most frequently found in the regions indicated. For the production of the Size of Scheme map, the data were analyzed on a county basis and regions incorporating 'large,' 'medium' and 'small' schemes are delineated.--Copyright 1972, Biological Abstracts, Inc.
W72-11419

GARDENS ON SWAMPS,
State Univ. of New York, Stony Brook.
P. Armillas.
Science, Vol 174, No 4010, p 653-661, 1971, Illus, Maps.
Identifiers: *Aztec, Gardens, *Land reclamation, Swamps, Valley of Mexico, *Archaeology.

Archaeological research verifies historical data on Aztec land reclamation in the Valley of Mexico.--Copyright 1972, Biological Abstracts, Inc.
W72-11425

KALAMAZOO RIVER FLOOD CONTROL PROPOSAL: A CASE STUDY,
Western Michigan Univ., Kalamazoo.
M. H. Ross.
Land Economics, Vol 48, No 1, p 57-61, February 1972. 3 tab, 10 ref.

Descriptors: *Cost-benefit analysis, *Flood control, *Estimation, *Planning, Project feasibility, Project benefits, Evaluation, Benefits, Costs.
Identifiers: *Kalamazoo River Flood Control Proposal, *Corps of Engineers.

The calculations of the Army Corps of Engineers' proposed project for controlling floods on the Kalamazoo River are examined. The benefit-cost calculations of the Corps have not been examined to determine their validity. The benefit-cost ratio is placed significantly below one-far below the Corps value which exceeded one. The Corps concludes that the Kalamazoo River flood control project is worthwhile because the annual benefits exceed the annual costs. Evidence is presented which indicates that the benefits are grossly overestimated, with the 1969 benefit-cost ratio being no more than .040 rather than 1.30 as the Corps states. Other factors are considered to supplement the basic argument. The factors are: an excessively low interest rate assumption, an overestimate of the life of the projects, and a declining trend of flooding. (Strachan-Chicago)
W72-11490

VENTURA MARINA, VENTURA COUNTY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 08A.
W72-11507

BETHEL SMALL-BOAT HARBOR, BETHEL, ALASKA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Anchorage, Alaska.

Available from the National Technical Information Service as PB-199 620D, $3.00 in paper copy, $0.95 in microfiche. May 28, 1971. 13 p, 1 map.

Descriptors: *Alaska, *Channel improvement, *Environmental effects, *Navigation, Dredging, Sediment control, Channel morphology, Excavation, Desilting, Wildlife habitats, Aquatic habitats, Fisheries, Turbidity, Water quality, Water pollution sources, Waterfowl, Retaining walls, Drainage effects, Spoil banks, Disposal.
Identifiers: *Environmental Impact Statements, *Bethel (Alas).

The project involves improvement of Brown's Slough at Bethel, Alaska, to provide a dependable,

all tide access to a housing project. The channel will be 6,700 feet long and 20 feet wide. Dredged material will be pumped to existing low areas adjacent to the channel. Dikes and sills will be incorporated to reduce siltation. Environmental impacts of the proposed project would include excavation of 166,500 cubic yards of unfrozen material and 17,750 cubic yards of permafrost, increased water turbidity, refuse removal from the banks of the slough, and from drainage out of spoil areas if retaining structures are not built. Adverse environmental effects would include destruction of some waterfowl habitats, disturbance of fish nursery grounds and water quality from drainage out of spoil areas if retaining structures are not built. Habitat losses, although permanent, will be small in proportion to the total habitat available. Alternatives include use of a boat lifting device to eliminate the need for some dredging, blasting, dragline construction, and no improvement. (Grant-Florida)
W72-11508

FALMOUTH LAKE, LICKING RIVER, KENTUCKY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 08A.
W72-11509

KANAWHA RIVER COMPREHENSIVE BASIN STUDY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Kanawha River Basin Coordinating Committee, Huntington, W. Va.

Available from the National Technical Information Service as PB-203 616D, $3.00 in paper copy, $0.95 in microfiche. June 1971. 18 p.

Descriptors: *Basins, *Environmental effects, *Interstate commissions, Project planning, Social aspects, Flood control, Environmental control, Governments, Ecology, *North Carolina, *Virginia, *West Virginia, Watersheds (Basins), Hydroelectric power, Waste disposal, Land management, Flow augmentation.
Identifiers: *Environmental impact statements, *Kanawha River basin.

The Kanawha Basin contains parts of three states, three physiographic provinces, two ecological regions, and varied economic activity. The Kanawha Basin Coordinating Committee Plan provides a framework for continuing development and management of water and related land resources in the basin. The plan reflects consideration of alternative means and objectives including National Income Efficiency and Regional Development and Environmental Quality Preservation. This development will include an expanded program for hydrological data collection, flood prevention and control, and waste disposal projects. Environmental impacts would include flood damage prevention, augmentation of low stream flows, hydroelectric power production, land treatment, and nonstructural measures for the protection and preservation of unique and scenic environmental areas. Adverse effects include loss of free-flowing streams, loss of wildlife habitat, family relocation, and changes in stream fishery. Irreversible and irretrievable commitments of resources will include labor, materials, wildlife habitat and land productivity. (Widman-Florida)
W72-11511

BUFFALO HARBOR, NEW YORK--MAINTENANCE (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Buffalo, N.Y.

Available from the National Technical Information Service as PB-204 670D, $3.00 in paper copy, $0.95 in microfiche. November 10, 1971. 6 p, 3 fig.

Descriptors: *New York, *Lake Erie, *Environmental effects, *Dredging, *Harbors, *Sedimentation, Water quality, Turbidity, Project benefits, Project purposes, Channels, Inland waterways, Navigation, Water pollution, Deposition (Sediments), Sediment distribution, Sediments, Excavation, Great Lakes, Disposal, Eutrophication.
Identifiers: *Environmental impact statements, *Buffalo Harbor (N.Y.).

The project consists of the maintenance of completed channels and structures in Buffalo Harbor by dredging. Water quality of the harbor is not conducive to development of public use areas. The maintenance is repeated annually and affects the same area. The dredging would result in short-term increases in turbidity and sedimentation, both in dredging and disposal areas. The dredging will have a favorable impact by removing polluted material and introducing oxygen. In the Lake Erie disposal area, the greater availability of oxygen permits nutrients in the spoil to encourage eutrophication. Alternatives considered are no maintenance, which would result in structure deterioration, and alternative spoil disposal sites. The only long-term ecological effect would be the creation of unnaturally shallow areas from spoil disposal. (Brackins-Florida)
W72-11512

PEARL RIVER, MISSISSIPPI AND LOUISIANA--NAVIGATION (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08A.
W72-11513

BUFFALO CREEK AT MEADOW GROVE, NEBRASKA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Neb.

Available from the National Technical Information Service as PB-202 081D, $3.00 in paper copy, $0.95 in microfiche. July 1971. 13 p, 1 map.

Descriptors: *Flood protection, *Nebraska, *Environmental effects, *Channel improvement, Dredging, Excavation, Stream improvement, Stream stabilization, Flood control, Water management (Applied), Project planning, Wildlife habitats, Natural streams, Flood plains, Waste disposal, Spoil banks.
Identifiers: *Environmental Impact Statements, *Buffalo Creek (Neb).

The project for channel improvement of Buffalo Creek at Meadow Grove, Nebraska, would consist of channel enlargement and realignment to protect against a flood having a 4% or less annual chance of occurrence. The current benefit cost ratio is 1.1. The proposed action will provide flood proofing of unprotected flood plains and loss of natural stream section and natural vegetation. The improved channel will replace the natural stream with some initial loss of wildlife habitat and stream fishery due to construction. Alternatives considered include flood plain zoning, flood proofing, excavation, reservoirs, levees, channel diversion, and no development. Irreversible and irretrievable commitments of resources will include labor and materials associated with construction, land used for the new channel construction and the land which has been designated as waste fill areas. (Widman-Florida)
W72-11529

WILLAPA RIVER AND HARBOR NAVIGATION PROJECT, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB-202 174D, $3.00 in paper copy, $0.95 in microfiche. August 27, 1971. 18 p, 3 plate.

Descriptors: *Washington, *Environmental effects, *Dredging, *Channel improvement, Excavation, Disposal, Desilting, Stream improvement, Navigation, Multiple-purpose projects, Project planning, Oceans, Aquatic habitats, Tides, Marshes, Economic impact, Control structures, Sediment control.
Identifiers: *Environmental Impact Statements, *Willapa River (Wash).

The Willapa River and Harbor Navigation Project in Pacific County, Washington, includes annual operation and maintenance dredging of navigation channels to maintain authorized depths. This project will contribute toward preserving the economic level of the region by maintaining the navigation channels. Disposing in the ocean removes all hopper-dredged material from the estuary, preventing any redeposition. Using different disposal areas on the ebb and flood tides reduces the amount of material available for redeposition within the estuary. Disposing of dredged material near the mouth of the estuary may adversely affect aquatic organisms occupying the bottom habitat of the disposal areas. Some lowland and marshland will be filled as a result of diking disposal sites. Alternatives considered include hopper dredging with disposal on all tides, hopper dredging with disposal on the ebb tide only, hopper dredging with direct pumpout capability, hopper dredging with ocean disposal only, clamshell dredging with ocean disposal by bottom-dump barge, pipeline dredging with disposal on diked tidelands or lowlands, controlling works, and sedimentation management. (Widman-Florida)
W72-11530

LITTLE CEDAR CREEK, COOSA RIVER BASIN, GEORGIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.

Available from the National Technical Information Service as PB-202 739D, $3.00 in paper copy, $0.95 in microfiche. June 1, 1971. 18 p, 1 plate, 6 tab.

Descriptors: *Georgia, *Dredging, *Environmental effects, *Channel improvement, *Channel flow, Administrative decisions, Flood control, Flood protection, Environmental control, Water management (Applied), Environmental engineering, Coordination, Project planning, Project benefits, Sedimentation, Sedimentation rates.
Identifiers: *Environmental Impact Statements, *Coosa River Basin (Ga).

This project will provide flood protection by increasing the discharge capacity of Little Cedar Creek at Cave Spring, Georgia. The improvement will be accomplished by enlarging, snagging, and clearing 3.2 miles of channel to reduce flood stage. Removed materials and debris will be disposed of in designated areas, after which appropriate landscaping will be applied. The project will generally upgrade areas adjacent to the channel and provide stabilization of property values. Water temperatures may be somewhat increased due to greater sun exposure. Higher flow rates may result in more sediment deposition downstream. The aquatic habitat will be adversely affected during construction byt these conditions will be temporary. Alternatives considered include a system of levees, a flood control reservoir, stream diversion, paved channel, and no development. (Widman-Florida)
W72-11537

LONGBOAT PASS, MANATEE COUNTY, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-202 643D, $3.00 in paper copy, $0.95 in microfiche. September 10, 1971. 26 p, 1 fig, 1 map, 2 photo, 3 tab.

Descriptors: *Florida, *Environmental effects, *Dredging, *Channel improvement, Comprehensive planning, Desilting, Coordination, Decision making, Water management (Applied), Disposal, Beaches, Hydraulic machinery, Navigation, Turbidity, Safety.
Identifiers: *Environmental Impact Statements, *Longboat Pass (Fla).

This project will provide safe and adequate passage of commercial fishing boats and recreational craft through Longboat Pass in Manatee County, Florida. Channelization will be by hydraulic dredge and acceptable dredge material will be placed on gulf beaches. If material is encountered which is unsuitable for beach fill, diked upland areas will be provided for disposal. Construction and maintenance dredging will cause temporary turbidity and the loss of minor amounts of bottom biota. Alternatives considered include no improvement, alternative channel alignments and dimensions, and alternative disposal methods and areas. (Widman-Florida)
W72-11539

LEVEE PROTECTION AND STREAM IMPROVEMENTS, SUGAR CREEK, AT AND IN THE VICINITY OF BREWSTER, OHIO (DRAFT ENVIROMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 08A.
W72-11541

ST. FRANCIS BASIN, MISSOURI AND ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08A.
W72-11542

TRANTERS CREEK, BEAUFORT, MARTIN AND PITT COUNTIES, NORTH CAROLINA FLOOD CONTROL (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.

Available from the National Technical Information Service as PB-200 338D, $3.00 in paper copy, $0.95 in microfiche. May 26, 1971. 13 p, 1 map.

Descriptors: *North Carolina, *Environmental effects, *Channel improvement, *Flood control, *Dredging, Bank stability, Spoil banks, Flood protection, Stream improvement, Multiple-purpose projects, Seed treatment, Vegetation effects, Natural streams, Drainage, Agriculture, Fisheries.
Identifiers: *Environmental Impact Statements, *Tranters Creek (N.C.).

The action will initiate construction of a flood control project consisting of clearing and snagging and channel excavation of Tranters Creek in Martin, Beaufort, and Pitt Counties, North Carolina. Spoil material would be placed along both sides of the banks and shaped to minimize erosion. The berm adjacent to the creek, the front face of the spoil, and a 16-foot wide strip on top of the spoil will be seeded. The project will provide reduction in flood stages, increased drainage, more intense agricultural practices, and loss of natural stream section and adjacent natural vegetation. Adverse environmental effects will include loss of fishery and other aquatic resources in the section of stream and the loss of trees and other natural vegetation within cleared right of way. Alternatives considered include reservoir storage, other variations of channelization, and no development. (Widman-Florida)
W72-11543

JACKSONVILLE HARBOR, FLORIDA (SECTION 2) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-199 457D, $3.00 in paper copy, $0.95 in microfiche. April 1, 1971. 16 p, 1 map.

Descriptors: *Channel improvement, *Florida, *Navigable rivers, *Monetary benefits, *Environmental effects, Atlantic Ocean, Industries, Economic feasibility, Navigation, Recreation, Wildlife habitats, Aquatic habitats, Freshwater marshes, Economic impact, Ships, Turbidity, Economic justification, Disposal.
Identifiers: *Environmental Impact Statements, *Jacksonville (Fla).

The project is located at Jacksonville, Florida, and would consist of enlarging the channel in the St. Johns River from the Atlantic Ocean to the municipal terminals. The construction and maintenance of the project will enhance the commercial cargo industry with a much needed navigation improvement. The project will provide opportunities for water related sports, picnicking, camping, and hiking. There will be temporary displacement of surface lands now serving as a habitat for animal and plant life. Approximately 107 acres of submarginal marsh will be destroyed, and project construction will cause a temporary increase in turbidity. The project will benefit the area's commercial and industrial enterprises and this will result in assuring continued economic growth in the community. Alternatives considered including varying the design dimensions of the channel, alternative methods of disposal of dredged material, and no project modifications. (Waldron-Florida)
W72-11546

KAUNAKAKAI HARBOR MAINTENANCE DREDGING, MOLOKAI, HAWAII (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.

Available from the National Technical Information Service as PB-199 613D, $3.00 in paper copy, $0.95 in microfiche. May 28, 1971. 8 p, 2 plate.

Descriptors: *Hawaii, *Environmental effects, *Harbors, *Channel improvement, Islands, Pacific Ocean, Dredging, Excavation, Fisheries, Turbidity, Aquatic habitats, Landfills, Marine animals, Marine fish, Vegetation effects, Vegetation regrowth, Disposal, Project planning.
Identifiers: *Environmental Impact Statements, *Molokai (Haiwaii).

The project involves maintenance dredging of Kaunakakai Harbor on the south-central coast of the island of Molokai, Hawaii. Approximately 48,000 cubic yards of material will be dredged and deposited on land or at a sea disposal area. The dredging will restore the harbor to the authorized federal depth of 23 feet. The land disposal area is situated in a low-lying area. The dredging will alter the physical condition of the harbor bottom by restoring about 8 acres to a 23 foot depth. No archaeological sites are known to be endangered. No rare animal or plant species are endangered. The dredging will create some temporary turbidity and some temporary destruction of the vegetative brush and cover in the land disposal area. Adverse environmental effects are limited to disturbance of the harbor fish population through habitat destruction and turbidity in the seaward disposal area. The only alternatives are to forego dredging or to construct a new harbor. (Grant-Florida)
W72-11548

LEWIS AND CLARK CONNECTING CHANNEL, OREGON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08A.
W72-11549

CHANNEL SNAGGING AND CLEARING PAINT CREEK, SOUTH OF CHILLICOTHE, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.

Available from the National Technical Information Service as PB-200 341D, $3.00 in paper copy, $0.95 in microfiche. April 30, 1971. 6 p.

Descriptors: *Ohio, *Environmental effects, *Flood protection, *Channel improvement, Flood control, Stream improvement, Flow characteristics, Erosion, Silting, Multiple-purpose projects, Project planning, Banks, Bank protection, Wildlife habitats, Levees, Floodproofing, Flood plain zoning, Turbidity.
Identifiers: *Environmental Impact Statements, *Chillicothe (Ohio).

The project consists of snagging and clearing, removal of trash and logs, bar removal, and bank shaping and associated work beginning in an area 23 miles south of Chillicothe, Ohio. The project will reduce flood stages along a 2.7 mile reach of Paint Creek by improving flow characteristics of the channel. The clearing of the streambanks and change in flow patterns will cause a temporary increase in erosion and siltation. Some low-value fish and wildlife habitat will be lost. Alternatives considered include channel widening and levees, zoning and floodproofing, and 'no action'. Irreversible and irretrievable commitments of resources would include labor and material required for construction and maintenance, and farmland which would be converted to urban development. (Widman-Florida)
W72-11554

FISH THAT WEED THE WATER.

Agricultural Research, p 6-7, May 1972.

Descriptors: *Aquatic weed control, *Fish, *Biocontrol, Fish diets, Carp, Weed control, Proteins, Aquatic plants, Sport fish, Submerged plants, Chara, Water hyacinth, Stocking, Spawning.
Identifiers: White amur, Hydrilla, Southern naiad, Duckweed.

The white amur, of the carp family, native to China, Manchuria, and Siberia, and used in the Soviet Union, Poland, Czechoslovakia, India, and China for both aquatic weed control and food is being studied by the Agricultural Research Service in Florida. It can tolerate wide temperature extremes making it adaptable to many parts of the United States; it will not spawn in U.S. waters unless artificially injected with hormones, providing a check against exploding populations. The amur has potential for an effective biological control agent, a source of dietary protein, and a challenging sport fish. Under ideal conditions, it can gain a half pound/month and exceed 60 pounds. Diets, stocking rates, and effects of the amur on environment are under study. During a 12-week study, the amur thrived on weeds as opposed to commercial fish foods. A weight gain of 60% was made on southern naiad but only 20% on commercial catfish food in indoor aquaria. Weight increased 294% on hydrilla and 83% on commercial trout chow in outdoor concrete tanks. Effect on water quality of its habitat was studied for 5 months in outdoor concrete tanks, indoor aquaria, and plastic pools. (Auen-Wisconsin)
W72-11568

COOPERATIVE COMMUNITY-UNIVERSITY WATER RESOURCE PLANNING: AN INTERDISCIPLINARY APPROACH,
Wisconsin Univ., Green Bay.
A. J. Bedrosian, W. O. Bennett, J. E. Berry, R. B. Ditton, and W. J. Johnson.
Paper presented at Seventh Annual American Water Resources Conference, October 25, 1971, Washington, D.C. 23 p. OWRR B-046-WIS (6), and B-065-WIS (1).

Descriptors: *Weed control, *Lakes, *Water resources development, Planning, Political constraints, Management, Recreation demand, Universities.
Identifiers: *Interdisciplinary approach.

An approach to planning and management of a lake heavily used for recreation and of substantial importance to the tourist economy of Northeastern Wisconsin is developed. Data requirements created a need for an interdisciplinary approach to the problems posed by this study. These requirements included determining (1) the actual biological, chemical, and physical problems existing in Lake Noquebay, the lake studied; (2) the problems perceived by Noquebay's public; (3) the impacts of the weed problem on the lake's users; (4) the existing and potential economic consequences of the public's behavioral response to the weed problem; (5) which factors underlay and gave rise to the weed problem; (6) what legal and political avenues are available to prevent intensification of the weed problem; and (7) which governmental agency was responsible for carrying out remedial programs. A framework, utilizing a three-dimensional matrix, is developed to analyze levels of public concern, management alternatives, and action agencies. Several structural and non-structural alternatives are evaluated on the basis of social and economic criteria, long- and short-term environmental impact, and legal-political feasibility. The role of universities in assisting communities with resource planning is also examined. (Settle-Wisconsin)
W72-11590

WATER AND URBAN DECENTRALIZATION IN NEW SOUTH WALES,
University of New England, Armidale (Australia). Dept. of Geography.
For primary bibliographic entry see Field 06D.
W72-11591

PUBLIC DOMAIN ADMINISTRATION--A SCIENTIFIC BASIS FOR WATERSHED MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11595

WATER QUALITY PREDICTION WITHIN AN INTERBASIN TRANSFER SYSTEM,
Texas Water Devleopment Board, Austin. Systems Engineering Div.
For primary bibliographic entry see Field 05B.
W72-11652

RANDOM-WALK MODEL OF STREAM NETWORK DEVELOPMENT,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 02J.
W72-11676

4B. Groundwater Management

CONJUNCTIVE USE OF WATER IN WEST TEXAS-BENEFITS TO NONCOOPERATORS,
Texas Tech Univ., Lubbock. Water Resources Center.
M. J. Mocek, B. J. Claborn, and D. M. Wells.
Available from the National Technical Information Service as PB-210 786, $3.00 in paper copy, $0.95 in microfiche. Texas Water Resources Center Report WRC 71-6 ICASALS Special Report No 49, September 1971. 83 p, 13 fig, 8 tab, 28 ref, append. OWRR C-1537 (No. 1993) (4).

Descriptors: *Water supply, *Irrigation, *Water storage, *Injection wells, *Texas, Methodology, Water wells, Aquifers, Model studies, Artificial recharge, Conveyance structures, Canals, Evaporation, Drought tolerance, Water conservation, Planning, Computer models, Groundwater, Hydrologic data.
Identifiers: *West Texas.

Utilization of the partially depleted Ogallala formation in the High Plains as a terminal underground storage reservoir for irrigation water in that area is described. The primary advantage would be reduction of the requirement for surface storage of water in West Texas. Water could be delivered to West Texas by the Trans-Texas Canal on an eleven-month basis. From a small regulating reservoir, the water could then be delivered to West Texas irrigators on a 12-month uniform flow basis with only short interruptions for maintenance of the distribution system. When the farmers were not irrigating, they could recharge this delivered water into the underground formation for storage through their irrigation wells. During irrigation seasons the farmers could combine pumpage from their wells with the imported water concurrently being delivered to them for application to their crops. Utilization of the underground formation as a storage reservoir in this manner would eliminate the necessity for holding delivered irrigation water in large surface reservoirs until needed at the farms; consequently, evaporation losses would be greatly reduced. (See also W71-04931, W71-08356 and W71-08357) (Woodard-USGS)
W72-11116

MODES OF OCCURRENCE OF LEAD AND ZINC IN CHELEKEN THERMAL BRINES (O FORMAKH NAKHOZHDENIYA SVINTSA I TSINKA V TERMAL'NYKH RASSOLAKH CHELEKENA),
Akademiya Nauk SSSR, Moscow. Institut Geologii Rudnykh Mestorozhdenii Petrografii, Mineralogii i Geokhimii.
For primary bibliographic entry see Field 02K.
W72-11118

ISOTOPIC COMPOSITION OF SULFATES IN NATURAL WATERS FROM SULFIDE DEPOSITS IN THE MIDDLE URALS (O VOZMOZHNOSTI ISPOL'ZOVANIYA IZOTOPNOGO SOSTAVA SUL'FATNOY SERY PRIRODNYKH VOD V KACHESTVE POISKOVOGO PRIZNAKA KOLCHEDANNOGO ORUDENENIYA NA SR EDNEM URALE),
Uralskoe Geologicheskoe Upravlenie, Sverdlovsk (USSR).
For primary bibliographic entry see Field 02K.
W72-11119

PALATLAKAHA RIVER WATERSHED, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11201

ANALOG SIMULATION OF WATER-LEVEL DECLINES IN THE SPARTA SAND, MISSISSIPPI EMBAYMENT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11279

WATER WELL AND GROUND-WATER CHEMICAL ANALYSIS DATA, SUTTON COUNTY, TEXAS,
Texas Water Development Board, Austin.
D. A. Muller, and J. R. Pool.
Texas Water Development Board Report 147, May 1972. 37 p, 3 fig, 2 tab.

Descriptors: *Groundwater resources, *Water wells, *Well data, *Chemical analysis, *Texas, Water quality, Aquifer characteristics, Water levels, Water utilization, Basic data collections.
Identifiers: *Sutton County (Tex.), Well inventory.

Basic groundwater data are tabulated from studies made in Sutton County from December 1968 to March 1969. Pertinent historical records are included. The investigation is part of an overall regional investigation of the groundwater resources of the Edwards Plateau, a study encompassing all or parts of 26 counties. Springs and wells, including domestic and livestock, irrigation, industrial, and public supply wells, were visited. Public officials and individual landowners and lessees were contacted in order to obtain information on each well. Where possible, the static water level and depth of each well were measured, and water samples for chemical analysis were taken from representative wells. The altitude of the land surface at each well location was determined from topographic maps. A total of 494 wells were inventoried, and 234 water samples were collected for chemical analysis. (Woodard-USGS)
W72-11290

THE GROUNDWATER FLOW SYSTEM IN THE DELMARVA PENINSULA,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 02A.
W72-11309

SUBSURFACE SITE CONDITIONS AND GEOLOGY IN THE SAN FERNANDO EARTHQUAKE AREA,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 02F.
W72-11316

ON THE SIGNIFICANCE OF THE HOERNER WALDORF WELL FIELD WATER-TABLE FLUCTUATIONS,
Montana Univ., Missoula. Water Resources Research Center.
R. L. Konizeski.
Available from the National Technical Information Service as PB-210 913, $3.00 in paper copy, $0.95 in microfiche. Report No. 25, Montana University Joint Water Resources Research Center, Bozeman, (1972), 17 p. OWRR B-024-MONT (2).

Descriptors: *Water wells, *Observation wells, *Water table, *Drawdown, *Montana, *Recharge, *Groundwater, Aquifers, Pulp and paper industry.

This report is concerned primarily with the observation well logs that were established in the Hoerner Waldorf Pulp and Paper Mill water well field. A new well field was developed in 1967. It consists of four production wells and four observation wells. All penetrate the same 25-35 foot thick aquifer which underlies the entire area at about 110-115 feet below land surface. Continuous and/or weekly records of water level fluctuations in the observation wells have been kept for the period January 1967 to September 1970 and have been correlated with records of the original Danforth well collected during the course of a USGS study. The consistent recovery over the years to/or closely approaching original static head in the various production wells apparently relates to recharge from the river. Hydrographs of some observation wells show less extreme water-level fluctuations because those wells are farther from the production wells and the river. A comparison of hydrographs of all four observation wells for the period January, 1967 - September, 1970, and the Danforth well for the period 1958 - 1963, shows that recharge-discharge has approached long term (annual) equilibrium.
W72-11383

TRITIUM AND RADIOCARBON IN HAWAIIAN NATURAL WATERS: PART I,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W72-11438

GROUND-WATER INVESTIGATIONS IN OKLAHOMA,
Geological Survey, Oklahoma City. Water Resources Div.
For primary bibliographic entry see Field 02F.
W72-11448

DRILLERS' LOGS OF WELLS IN HARRIS COUNTY, TEXAS, 1905-71,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W72-11449

GROUNDWATER IN LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 07C.
W72-11462

GEOHYDROLOGY OF JEFFERSON COUNTY, NORTHEASTERN KANSAS,
Kansas State Geological Survey, Lawrence.
J. D. Winslow.
Kansas Geological Survey Bulletin 202, Part 4, April 1972. 20 p, 2 fig, 1 plate, 3 tab, 15 ref.

Descriptors: *Hydrogeology, *Water wells, *Aquifer characteristics, *Water quality, *Kansas, Chemical analysis, Geology, Water analysis, Groundwater, Water yield, Water utilization, Groundwater recharge, Basic data collections, Water supply, Irrigation, Hydrologic data.
Identifiers: *Jefferson County (Kans).

Geohydrologic data for Jefferson County, Kansas, are based on geologic mapping, geologic interpretation of aerial photographs, test-hole logs and drillers' logs, inventory of selected wells, and analyses of water samples from selected wells. The largest quantities of groundwater are available from wells in alluvium in the Kansas River valley with yields of as much as 1,350 gpm. Because the use of groundwater for irrigation is seasonal, and because pumping for municipal or public-supply use is small compared with the amount of groundwater available, the natural slope of the water table in the area essentially is unaffected. The concentration of dissolved solids ranges from 125 to 1,190 mg/liter, with most values ranging from 300 to 600 mg/liter. Data pertaining to 231 water wells and test holes are tabulated. (Woodard-USGS)
W72-11464

THE AQUEOUS UNDERGROUND,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W72-11466

A NEW STEAM WELL IN THE TRAVALE GEOTHERMAL AREA (TUSCANY, ITALY).

Geothermics (Italy), Vol 1, No 1, p 41, March 1972. 1 fig.

Descriptors: *Geothermal studies, *Thermal water, *Steam, *Wells, *Drilling, Thermal stress, Temperature, Pressure, Gases, Chemical properties.
Identifiers: *Italy (Travale geothermal area).

On January 7, 1972, Travale 22 well blew out with an enormous output of fluid (about 450 tons/hr). The well was drilled in a geothermal basin located to the east of the geothermal basin of Larderello (Italy). Drilling started on October 28, 1971 and finished on January 4, 1972. The total depth of the well is 688 m; the well reached the main reservoir (Triassic anhydrites and brecciated magnesian limestones) at a depth of 642 m. After drilling, pressure and temperature measurements were carried out in the well with an Amerada apparatus. At the well bottom the pressure was 64.7 ata (kg/sq cm absolute) and the temperature rose to 245 deg C in 52 hours, while it was 135 deg C just two hours after the end of drilling. The blow-out occurred 15 hours later. (Woodard-USGS)
W72-11467

SOME CONSIDERATIONS ON THE FLOW--RATE/PRESSURE CURVE OF THE STEAM WELLS OF LARDERELLO,
Politecnico di Milano (Italy). Instituto di Fisica Tecnica.
O. Rumi.
Geothermics (Italy), Vol 1, No 1, p 13-23, March 1972. 12 fig, 1 tab, 4 ref.

Descriptors: *Geothermal studies, *Thermal water, *Steam, *Wells, *Flow rates, Pressure, Borehole geophysics, Investigations, Mathematical studies, Theoretical analysis, Data collections, Equations, Curves.
Identifiers: *Italy (Larderello), Relationship curves.

The flow-rate/pressure relation for the geothermal wells of the Larderello area (Italy) is considered. After an examination of the experimental results recorded for many years, and after the discussion of the experimental flow-rate/pressure curve, the theoretic link between pressure and flow-rate at the mouth of the borehole was studied. The results of the experimental and theoretical approach were then compared, and a best fit curve proposed. The flow-rate/well bottom pressure curve as the true characteristic of the whole system of flow is suggested. (Woodard-USGS)
W72-11468

SUBSURFACE POLLUTION PROBLEMS IN THE UNITED STATES,
Environmental Protection Agency, Washington, D.C. Fresh Water Pollution Control Section.
For primary bibliographic entry see Field 05B.
W72-11472

DEEP GEOTHERMAL TEST WELL, GEOTHERMAL RESOURCE INVESTIGATIONS, IMPERIAL VALLEY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3 Office.

Available from the National Technical Information Service as PB-206 161D, $3.00 in paper copy, $0.95 in microfiche. January 31, 1972. 19 p.

Descriptors: *Environmental effects, *California, *Geothermal studies, *Wells, Alternate planning, Multiple-purpose projects, Desalination, Deserts, Investigations, Administrative agencies, Information retrieval, Research and development, Exploration, Testing, Water resources development, Electricity.
Identifiers: *Environmental Impact Statements, *Imperial Valley (Calif).

A deep geothermal test well would be drilled to a depth between 4,000 and 8,000 feet in the East Mesa area of Imperial Valley, California. The well would have a slight impact on the underground strata due to the comparatively small amounts of fluid withdrawn for testing. It would provide information of value to a determination of the potential for geothermal resources to provide large quantities of desalted water in conjunction with relatively pollution-free production of electric energy for the water and power short Southwest. Drilling would require that approximately 10 acres of now barren desert be cleared for drilling operations. Impact on fish and wildlife, the air, plant life, and area aesthetics would be minimal. Alternatives considered include other methods of investigation and no testing. (Widman-Florida)
W72-11559

PHOTOSYNTHESIS--POLICIES AND PROGRAMS FOR GREAT POTENTIALS, BEGINNING STAGES FOR EFFECTIVE WATER MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11594

TECHNIQUES FOR ASSESSING WATER RESOURCE POTENTIALS IN THE DEVELOPING COUNTRIES WITH EMPHASIS ON STREAMFLOW, EROSION AND SEDIMENT TRANSPORT, WATER MOVEMENT IN UNSATURATED SOILS, GROUND WATER, AND REMOTE SENSING IN HY DROLOGIC APPLICATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W72-11672

GEOHYDROLOGY OF THE LOWER VERDIGRIS RIVER VALLEY BETWEEN MUSKOGEE AND CATOOSA, OKLAHOMA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W72-11677

PRELIMINARY APPRAISAL OF GROUND WATER IN STORAGE WITH REFERENCE TO GEOTHERMAL RESOURCES IN THE IMPERIAL VALLEY AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
L. C. Dutcher, W. F. Hardt, and W. R. Moyle, Jr.
Geological Survey Circular 649, 1972. 57 p, 20 fig, 4 tab, 109 ref.

Descriptors: *Groundwater resources, *Geothermal studies, *Thermal water, *Usable storage, *California, Water costs, Water quality, Salinity, Groundwater, Water wells, Aquifer characteristics, Water yield, Pumping, Water utilization, Groundwater recharge, Thermal pollution.
Identifiers: *Imperial Valley (Calif), Recoverable groundwater.

Imperial Valley, California, occupies part of a deep sediment-filled structural basin that extends south from the Coachella Valley in California to the Gulf of California. Because of the extremely high temperatures at depth throughout the basin and at relatively shallow depth in areas of anomalously high heat flow, the deposits are undergoing metamorphism. The active metamorphism has caused changes in the original porosity and permeability of the rocks and deposits. The total usable and recoverable water is estimated to be 1.1 billion acre-feet, of which about 200 million acre-feet is at a temperature of 150 C or greater. The combination of low well yields, energy costs in excess of $100 per acre-foot for lifts greater than 5,000 feet, and very high costs of wells will probably prevent pumping most of the estimated usable and recoverable water. If as much as 1,000 feet of pumping lift would be economically justified, about 100 million acre-feet of water might be recoverable from the shallow aquifers. (Woodard-USGS)
W72-11678

GROUNDWATER MANAGEMENT ON THE TEXAS HIGH PLAINS,
Southwestern Great Plains Research Center, Bushland, Tex.
O. R. Jones, and A. D. Schneider.
Water Resources Bulletin, Vol 8, No 3, p 516-522, June 1972. 3 fig, 1 tab, 16 ref.

Descriptors: *Water management (Applied), *Texas, *Groundwater, *Water quality control, *Conjuctive use, Water reuse, Return flow, Irrigation water, Irrigation operation and maintenance, Irrigation practices, Water conservation.
Identifiers: Ogallala aquifer (Texas).

The effects of major water management practices on the pumping requirement from the Ogallala aquifer are discussed. Demand on the aquifer may

be reduced as much as 15% by recycling irrigation runoff, 25% by recycling irrigation runoff and irrigating with water from playas, and 29% by recycling irrigation water in combination with irrigation from playas and artificial recharge of playa water to the aquifer. Other practices that can result in more efficient use of precipitation and groundwater are limited irrigation, land forming, soil profile modification, and improved irrigation systems, thereby reducing the pumping demand on the Ogallala. Additional water supplies can be obtained by water harvesting, weather modification, and water importation. The overdraft on the aquifer can be reduced by the application of sound water management practices on an area-wide basis. (Knapp-USGS)
W72-11679

4C. Effects on Water of Man's Non-Water Activities

GRAHAM BURKE PUMPING PLANT, ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08C.
W72-11514

WATER AND URBAN DECENTRALIZATION IN NEW SOUTH WALES,
University of New England, Armidale (Australia). Dept. of Geography.
For primary bibliographic entry see Field 06D.
W72-11591

QUALITY OF STORMWATER DRAINAGE FROM URBAN LAND,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
For primary bibliographic entry see Field 05B.
W72-11651

4D. Watershed Protection

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, HOPKINS COUNTY IN KENTUCKY, TRADEWATER RIVER RC AND D PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-203 511-D, $3.00 in paper copy, $0.95 in microfiche. October 14, 1971. 7 p, 1 tab.

Descriptors: *Environmental effects, *Watershed management, *Administration, *Erosion control, *Kentucky, Flood control, Land improvement, Water management (Applied), Adoption of practices, Administrative decisions, Comprehensive planning, Coordination, Multiple-purpose projects, Planning, Administrative agencies, Balance of nature, Environmental engineering.
Identifiers: *Environmental impact statements.

The Hurricane Creek Watershed Structural Project Measure in Hopkins County, Kentucky, would provide a 100-year level of flood protection to 170 acres of flood plain and reduce erosion and sediment problems in the 4300 acre watershed. This will be accomplished by the installation of three floodwater retarding structures, improvement of approximately 4 miles of channel, and land treatment work. The sediment pools of the three flood retarding structures will provide 36 acres of temporary lake fishery. Installation of the measure will permit more intensive use of the flood plain for both agricultural and industrial purposes. This draft environmental statement lists adverse environmental effects as commitment of 48 acres of agricultural and forestry land for the sediment pools and structure areas and the loss of wildlife uses on 36 acres of land in the sediment pools, along with temporary disruption of such uses on another 126 acres in the flood pools, and other disturbed areas. Alternatives considered were one large floodwater retarding structure, alternate locations for the three floodwater structures, installation of the structures alone, and taking no action. Irreversible and irretrievable commitments of resources include the loss of agricultural and wildlife use on 36 acres in the sediment pool and 12 acres of dams and spillways lost to agriculture. (Widman-Florida)
W72-11184

EDEN WATERSHED, MISSISSIPPI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-203 301-D, $3.00 in paper copy, $0.95 in microfiche. August 23, 1971. 11 p, 1 map.

Descriptors: *Mississippi, *Environmental effects, *Flood protection, *Channel improvement, Flood plains, Erosion control, Watershed management, Silting, Sedimentation, Wildlife habitats, Deltas, Agricultural watersheds, Vegetation effects, Canal construction, Structures, Stream stabilization, Floodwater, Dredging, Project planning.
Identifiers: *Environmental Impact Statements.

The project will involve conservation land treatment supplemented by one floodwater retarding structure, three grade stabilization and sediment control structures, and about 29 miles of stream channel improvement in the Eden Watershed. Environmental impacts would include reduction of residential and agricultural flooding from vegetation planting which also will provide new food and cover for wildlife reduction of silt and sand deposits on flood plain land, elimination of woodlands by inundation, loss of wildlife habitat, erosion reduction, and loss of agricultural production and wildlife food on about 50 acres of cropland. Adverse impacts would include loss of agricultural use and wildlife habitat, and periodic interruption of agricultural use and wildlife habitat in 11 acres of woods to be used for temporary floodwater detention. Alternatives considered were conservation land treatment alone, less intensive use by retiring overly wet cropland to pasture land, and continuing present agricultural use. (Grant-Florida)
W72-11189

COW CREEK WATERSHED, OKLAHOMA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. Watershed Planning Div.
For primary bibliographic entry see Field 08A.
W72-11262

CLARKS FORK--BULLOCKS CREEK WATERSHED, SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-203 877D, $3.00 in paper copy, $0.95 in microfiche. September 1971. 14 p, 1 map, 1 illus.

Descriptors: *South Carolina, *Environmental effects, *Flood protection, *Watershed management, Erosion control, Flood control, Land management, Water management (Applied), Water supply, Multiple-purpose projects, Recreation, Land development, Streams, Lakes, Detention reservoirs, Sedimentation, Fisheries.
Identifiers: *Environmental Impact Statements.

The project, located in York County, South Carolina, would consist of conservation land treatment over the watershed, supplemented by six floodwater retarding structures, one multiple purpose structure for flood prevention and recreation, and 360 acres of critical area treatment. The project will reduce erosion and sedimentation; reduce floodwater damages by 87 percent; benefit 100 farms; provide new wildlife habitat; create a 650 acre recreation lake and related facilities for an expected 230,000 visitor days annually; create 394 acres of lake fishery at the six floodwater retarding structures; and create additional local employment opportunities. Adverse effects would include elimination of agricultural and wildlife use on 1,044 acres; periodical interruption of agricultural and wildlife use in the 1,110 acres used for detention pools; elimination of agricultural and wildlife use of 117 acres in dams and spillways until these areas are revegetated; inundation of 15 miles of stream channels; and increased vehicular traffic in the recreation area. Alternatives considered include conservation land treatment alone, less intensive use of the flood plain, alternate combinations of floodwater retarding structures, channel improvement to supplement the floodwater retarding structures, and other locations for the recreation development area. (Widman-Florida)
W72-11269

EFFECT OF POLYMERS ON THE RESISTANCE OF SOILS TO EROSION,
N. A. Muromtsev.
Nauchn Tr Obninsk Oto Geogr Obshch SSSR. 1. 1. p 26-30. 1968.
Identifiers: Erosion, *Polymers, Soils, *Erosion control, *Soil erosion, *Soil treatment.

Resistance to erosion increases with the dose (0.01-0.05%) of polymers. With polyacrylamide and polyacrylnitrile, the effective concentrations are 0.05 wt% of soil for horizon A and 0.01 wt% for horizon B1. 'Vam' polymer (0.01-0.05%) was ineffective for horizon A and even damaging for horizon B1.--Copyright 1972, Biological Abstracts, Inc.
W72-11337

GREEN MANURE IN EROSION CONTROL AND FERTILITY IMPROVEMENT OF ERODED SOILS,
V. I. Donyushkin, and V. A. Bannyi.
Byull Gos Nikit Bot Sad. Vol 1, No 12, p 48-50. 1970.
Identifiers: *Erosion control, Fertility, *Manure, Pea-D, Rye-M, Vetch-D, *Soil erosion, *Crimea.

On the southern coast of the Crimea and in its foothills, green manure consisting of field pea, spring pea, vetch, rye and their mixtures considerably reduces or completely prevents erosion. Plowed-under green manure, particularly field pea and vetch, improves soil fertility by increasing the content of organic matter, N, P and K.--Copyright 1972, Biological Abstracts, Inc.
W72-11339

SNOWMELT CONTROL ON BELORUSSIAN ERODED LOAMY SOD PODZOLIC SOILS,
U. V. Zhylko, and H. Kazakou.
Vyestsi Akad Nauk Byelarus SSR Ser Sel'-Skahaspad Nauk. 2. p 53-55. 1969.
Identifiers: *Belorussian, *Erosion control, Loamy, *Podzolic soils, Soils, USSR, *Snowmelt control, Snow packing.

Snowmelt was controlled by packing the snow on the upper slopes (Where the snow cover was thin) to slow its melting and by blackening the snow on the middle and lower slopes (where the snow cover was considerably thicker) to insure more rapid melting. Melting became more uniform, the soil absorbed more water, erosion was lessened, and water reserves were increased.--Copyright 1972, Biological Abstracts, Inc.
W72-11345

THE INTERACTION OF PLANT COVER AND ENVIRONMENTAL CONDITIONS IN GEOLOGICAL WATER CATCHMENT BASINS,
I. A. Titov.
Tr Vses Sel'Skokhoz Inst Zaoch Obrazov. 35 p, 88-101. 1970.
Identifiers: *Watersheds (Basins), Development, *Environment, Erosion, Geology, Interaction, Land, Management, Plants, *Vegetation.

'Water catchment basin' is not only a hydrological but also a geochemical concept; its principal characteristics are a geological basis (rocks), geological structure, and activity of the surface, soil, and bedrock waters. Any plant association in it cnhanges the environment, not only in its habitat, but also on the slope below and sometimes also above; the fluid and solid runoffs cause an extension of the influence of the vital activities of each plant association. The entire complex of environmental conditions and plant associations of the the basin constitutes a single geovegetational system (of a basin, gully, etc.). Depending on the climate, vegetation, and nature of the migration of the elements, the geovegetational system may be humus-, peat-, or salt-accumulative, or some transitional state. In basins with active erosion processes which plant associations cannot endure, what is formed is not so much a geovegetational as a geodynamic system, or, in brief, the geosystem of a water catchment basin. Emphasis is given to the importance for land management of the interaction of the processes in the system.--Copyright 1972, Biological Abstracts, Inc.
W72-11401

WATERSHED PLANNING.
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W72-11439

BOXELDER CREEK WATERSHED, COLORADO AND WYOMING (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. Watershed Planning Div.
For primary bibliographic entry see Field 08A.
W72-11540

PUBLIC DOMAIN ADMINISTRATION--A SCIENTIFIC BASIS FOR WATERSHED MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11595

FOREST REPLANTING ON THE TERRACES OF OPEN CUT MINING WORKS IN THE UKRAINE,
V. N. Dan'Ko.
Lesovod Agrolesomelior Resp Mezhved Temat Nauchn Sb. 18. 7-11. 1969.
Identifiers: Acer-Tataricum-D, *Erosion control, Elaeagnus-Angustifolia-D, Erosion, *Trees, Fertilizers, Forest, Fraxinus-Pennsylvanica-D, Lonicera-Tatarica-D, Malus-D, Mining, Pinus-Banksiana-G, Pinus-Sylvestris-G, Planting, Pyrus-D, Quercus-Robur-D, Robinia-Pseudacacia-D, Salix-Alba-D, Terraces, *Ukraine, USSR.

The following tree species are used: Pinus sylvestris, P. banksiana, Robinia pseudacacia, Elaeagnus angustifolia, Quercus robur, Acer tataricum, Fraxinus pennsylvanica, Salix alba, Lonicera tatarica, Malus, Pyrus and others. Most of these trees possess a good survival rate and are characterized by satisfactory and good growth. Thorough planning of the site to prevent gully erosion and supplying the fertility requirements of the individual tree species are important.--Copyright 1972, Biological Abstracts, Inc.
W72-11673

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

NONDESTRUCTIVE DETERMINATION OF ELEMENTS IN SPECIFIC FRESHWATER MICROPLANKTON BY ACTIVATION ANALYSIS,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
M. Merlini, O. Ravera, and C. Bigliocca.
Modern Trends in Activation Analysis, Vol 1, June 1969, p 475-481. 1 fig, 4 tab, 17 ref.

Descriptors: *Neutron activation analysis, *Trace elements, *Zooplankton, *Phytoplankton, Analytical techniques, Spectroscopy, Laboratory tests, Sampling, Manganese, Calcium, Potassium, Sodium, Nutrient requirements, Water quality control, Pollutant identification.
Identifiers: *Decay time, *Interferences.

Samples of water were obtained from 4 freshwater lakes and selectively filtered. The microplankton filtered from the water were placed in six categories according to size. The categories were: I = > 1180 micro m; II = 950 to 1180 micro m; III = 700 to 950 micro m; IV = 500 to 750 micro m; V = 295 to 500 micro m; and VI = 85 to 295 micro m. Phytoplankton was concentrated in the finest fraction, number VI, while almost all the zooplankton was present in I to V. Analyses of Ca, Mn, K, and Na were made on dried samples by neutron activation and gamma spectrometry of the irradiated samples. Results indicated: (1) rapid determinations of Ca, Na, Mn, and K content of small quantities of microplankton are possible, with the same samples left suitable for use for the determination of other elements; (2) phytoplankton (primarily Tabellaria) had higher levels of Ca and K than Na; (3) Caldocera and Copepoda concentrate Ca by approximately the same amount irrespective of the Ca content in the water in which they are found. (Lowry-Texas)
W72-11093

FLUID CONTAMINATION MEASURING SYSTEM,
Alpha Advanced Systems, Inc., Inglewood, Calif. (assignee).
J. E. Friederichs, E. E. Friederichs, and L. Weg.
U. S. Patent No. 3,655,052, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 500, April 11, 1972.

Descriptors: *Patents, *Remote sensing, Measurement, *Water pollution, *Water quality control, Pollutant identification.

A fluid pollution measuring system consists of a sampling valve adapted to continuously withdraw a small representative portion of a stream flowing in an enclosed conduit. A filter moves in proportion to the cumulative amount of particles retained in it. The filter is connected to a sensor adapted to detect directly, but remotely the movement of the filter. (Sinha-OEIS)
W72-11139

SANITARY-BIOLOGICAL CONDITIONS AT PURIFICATION INSTALLATIONS,
Kharkov State Univ. (USSR).
For primary bibliographic entry see Field 05C.
W72-11216

CHLORINATED HYDROCARBON RESIDUES IN MARINE ANIMALS OF SOUTHERN CALIFORNIA,
Westinghouse Ocean Research Lab. Annapolis, Md.
For primary bibliographic entry see Field 05C.
W72-11235

SUMMARY OF PLANS FOR ACQUISITION OF SURFACE-WATER DATA BY FEDERAL AGENCIES, FISCAL YEAR 1973: STAGE, STREAMFLOW AND QUALITY.
Geological Survey, Washington, D.C. Office of Water Data Coordination.
For primary bibliographic entry see Field 07A.
W72-11287

A HYDROLOGICAL-METAL POLLUTION STUDY, HEATH STEELE MINES AREA, NEW BRUNSWICK, CANADA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05B.
W72-11300

ANALYSES OF LONG-TERM TRENDS IN WATER-QUALITY PARAMETERS,
Geological Survey, Trenton, N.J. Water Resources Div.
For primary bibliographic entry see Field 05B.
W72-11304

SIMPLE DETERMINATION OF DISSOLVED ORGANIC CARBON IN POLLUTED WATERS,
A. Otsuki, and T. Hanya.
Misc Rep Res Inst Nat Resour. Vol 71 p 38-39. 1969.
Identifiers: *Pollutant identification, Acetate, Benzenesulfonate, Benzoate, *Organic carbon, Chloride, Citric acid, Dodecyl, Fructose, Glucose, Glutamic acid, Histidine, Scenedesmus, Sodium, Starch, Analytical techniques.

The present method gives good recovery for glucose, fructose, sodium acetate, citric acid, glutamic acid, histidine HCl and sodium benzoate. Soluble starch and dodecyl benzene sulfonate also were tested. Their recovery ranged from 90-100% in all compounds tested, with the exception of docyl benzene sulfonate which gave a value of 75%. Persulfate oxidation gave unsatisfactory results (55-65%) for wet combustion of green algal cell, Scenedesmus sp. killed by freezing-dry. Unsatisfactory results may be obtained in measurements of the sample containing suspended organic matter.--Copyright 1972, Biological Abstracts, Inc.
W72-11314

THE SEPARATION OF IONIC AND ORGANIC MERCURY FROM WATER USING MILK PROTEINS, XANTHATES AND KERATIN,
Virginia Polytechnic Inst. and State Univ., Blacksburg, Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W72-11317

PESTICIDE MOBILITY IN SOILS: II. APPLICATIONS OF SOIL THIN-LAYER CHROMATOGRAPHY,
Agricultural Research Service, Beltsville, Md. Plant Science Research Div.
For primary bibliographic entry see Field 05B.
W72-11353

THE DESIGN OF A CONTINUOUS FLOW BIOLOGICAL EARLY WARNING SYSTEM FOR INDUSTRIAL USE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05G.
W72-11393

IMPROVED METHODS FOR DETERMINING CONTENTS OF CHLOROPHYLL, PROTEIN, RIBONUCLEIC ACID, AND DEOXYRIBONUCLEIC ACID IN PLANKTON POPULATIONS,
Nagoya Univ. (Japan). Research Inst. of Biochemical Regulation.
T. Iwamura, H. Nagai, and S. E. Ichimura.
Int Rev Gesamten Hydrobiol. Vol 55 No 1 p 131-147. 1970.

Identifiers: *Analytical techniques, Chlorella, Chlorophyll, DNA, Habitats, Lakes, Phaeodactylum, *Plankton, Populations, Protein, RNA.

Improved methods of assay of the 4 cellular components, chlorophyll, protein, RNA and DNA contained in planktonic populations were described. As preliminaries and controls, analyses were performed with laboratory (pure) clutures of a fresh water green alga, Chlorella, and a marine diatom, Phaeodactylum. The same analyses were performed with planktonic populations collected from varying depths in 3 lakes (Lake Nakanuma, Lake Haruna and lake Yunoko) and in sea (Suruga Bay). Most of them (except for Lake Yunoko) showed, at the time of water sampling, characteristic stratification of planktonic populations, which may not be easily detectable by the conventional survey methods. The result obtained in these natural water were compared with each other as well as the those obtained with laboratory-grown algae mentioned above. The assay methods adopted and these results were discussed.--Copyright 1972, Biological Abstracts, Inc.
W72-11410

A STUDY OF OXIDANT CONCENTRATION TRENDS IN THE SAN FRANCISCO BAY AREA,
Bay Area Air Pollution Control District San Francisco, Calif. Dept. of Meteorological Data Analysis.
J. S. Sandberg, R. Thuillier, and M. Feldstein.
J Air Pollut Contr Ass. Vol 21, No 3, p 118-121. 1971. Illus.
Identifiers: *Air pollution, Air temperature, *Oxidants, *San Francisco Bay area, California.

To estimate annual changes in emission levels, and thus of control program effectiveness, the meteorological stratification of data was employed to provide 'comparable days'. For the San Francisco Bay Area photochemical oxidant data, simple criteria based on maximum temperature and on height of inversion base were selected. Temperature provided a readily available integrated index of solar energy input and of ventilation, while the inversion data added a vertical dilution factor. An earlier study, employing only the temperature criteria, showed that oxidant levels on comparable warm days had nearly doubled from 1954 through 1962. The current study of oxidant data 1962-1969 shows a gradual rise through 1965, and a sharp reversal in 1966, when for the first time a simultaneous decrease was noted at each benchmark station. Data through 1969 show that average oxidant levels have been maintained at this 25% lower plateau, with minor fluctuations at individual stations. The general improvement in air quality since 1965 is attributed to the reduction of reactive organics emitted from stationary and automotive sources.--Copyright 1972, Biological Abstracts, Inc.
W72-11422

TRITIUM AND RADIOCARBON IN HAWAIIAN NATURAL WATERS: PART I,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W72-11438

CHROMIUM IN WATER--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 05B.
W72-11442

ALDRIN AND ENDRIN IN WATER--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 05B.
W72-11443

CHARACTERIZATION OF TASTE AND ODORS IN WATER SUPPLIES,
Connecticut Univ., Storrs. Regulatory Biology Section.
R. P. Collins.
Copy available from GPO Sup Doc EP2.10:16040 DGH 08/71, $0.35; microfiche from NTIS as PB-211 025, $0.95. Environmental Protection Agency Water Pollution Control Research Series. August, 1971, 21 p, 1 fig, 8 ref. EPA Program 16040 DGH 08/71.

Descriptors: *Taste, *Odor, *Organic compounds, Analytical techniques, Separation techniques, Gas chromatography, Sepctroscopy, Algae, Actinomycetes, Fungi, Laboratory tests, Water quality control.
Identifiers: *Odor-producing algae.

Cultured samples of Streptomyces odorifer, Synura petersenii, and Trichoderma viride, an actinomycete, an algae, and a fungus, respectively, were steam distilled and the aqueous distillates were then extracted with an organic solvent and reduced to a small volume for analysis to determine their odorous constituents. Analysis of the extracts was by gas chromatography, infrared, mass, and nuclear magnetic spectroscopy. The major odorous constituents of Streptomyces odorifer were identified as trans-1, 10-dimethyl-trans-9-decalol (geosim), 2-exo-hydroxy-2-methylbornane, and cadin-4-ene-1-ol. A large number of odorus compounds were identified from Synura petersenii, with heptanol containing the odor normally associated with Synura petersenii. The major odorous compound produced by Trichoderma viride was 6-pentyl-2-pyrone. (Lowry-Texas)
W72-11604

NEUTRON ACTIVATION ANALYSIS OF VANADIUM IN NATURAL WATERS,
Colorado Univ., Boulder, Dept. of Civil Engineering.
K. D. Linstedt, and P. Kruger.
Modern Trends in Activation Analysis, Vol 1, June 1969, p 87-92, 2 fig, 2 tab.

Descriptors: *Analytical techniques, *Neutron activation analysis, *Natural streams, Dissolved solids, Radioisotopes, Sodium, Chlorides, *Pollutant identification.
Identifiers: *Vanadium, Interferences, Sample concentration, Radiochemical separation, Colorado River, Sacramento River, San Joaquin River.

Radiochemical separation methods and gamma-ray spectroscopic analysis were combined with neutron activation analysis to achieve a maximum sensitivity in excess of that required to measure vanadium in natural water containing large amounts of dissolved solids. Preirradiation sample concentration and postirradiation radiochemical separation procedures were required to reduce interferences. Samples were irradiated at a thermal neutron flux of about 10'n/cm2/sec for five minutes. For river waters, the major analytical interference was contributed by the gamma rays of 15 h 24Na and 37.3 min. 38Cl. The neutron activation analysis procedure was applied to the analyses of 170 natural water samples collected at 11 different sites throughout the Sacramento, San Joaquin, and Colorado River basins. A summary of the concentration data from these sites was presented in tabular form showing the range of concentrations observed as well as the mean concentration value. The vanadium concentrations ranged from a low of 0.2 mg/l to a high value of 49.2 mg/l. (Galwardi-Texas)
W72-11607

SPECIFIC ACTIVATION ANALYSIS TECHNIQUES AND METHODS FOR THE ASSAY OF TRACE SUBSTANCES IN AQUATIC AND TERRESTRIAL ENVIRONMENTS,
Missouri Univ., Columbia. Dept. of Nuclear Engineering and Radiological Sciences.
G. W. Leddicotte.
Modern Trends in Activation Analysis, Vol 1, June 1969, p 76-80. 4 tab.

Descriptors: *Analytical techniques, *Trace elements, *Neutron activation analysis, Spring waters, Industrial water, Pesticide residues, Vegetation, Soils, Manganese, Magnesium, Copper, Gamma rays, *Pollutant identification.
Identifiers: Deionized water, Bromine, Cerium, Lanthanum, Scandium, Thorium, Gamma ray spectrometer.

Samples of water, soil, stream sediments, dusts, and vegetation were assayed for unusual, as well as common, elements utilizing neutron activation analysis techniques. Activation analyses were conducted at a flux of at least 5 x 10 to the 13th power m per cm sq per sec. Irradiation periods ranged from 30 seconds to 20 minutes. A multichannel gamma-ray spectrometer was used for all radioactivity measurements. Results from investigations of trace elements in deep spring waters, raw industrial waters and deionized water were arranged in tabular form. Also, chloride pesticide residues, trace concentrations of bromine, manganese, magnesium and copper in vegetation and cerium, lanthanum, scandium, and thorium in soils were reported. (Galwardi-Texas)
W72-11612

THE CONTROL AND REMOVAL OF MATERIALS OF ECOLOGICAL IMPORTANCE FROM WASTEWATERS IN LOS ANGELES, CALIFORNIA, U. S. A.,
Los Angeles Bureau of Sanitation, Calif.
For primary bibliographic entry see Field 05B.
W72-11624

COPPER, MANGANESE AND ZINC CONCENTRATIONS IN GULF OF MEXICO WATERS,
Texas A and M Univ., College Station.
J. F. Slowey, and D. W. Hood.
Geochimica et Cosmochimica Acts, Vol 35, No 2, p 121-138, February 1971. 3 fig, 13 tab, 23 ref. AEC Contract Nos, AT (40-1)-2799 and AT- (04-3)-310.

Descriptors: *Trace elements, *Gulf of Mexico, *Copper, *Manganese, *Zinc, Chemical analysis, Analytical techniques, Sampling, Water chemistry, Sea water, Water pollution sources, Pollutant identification.

Nuetron activation analysis techniques were used to determine the total concentration of copper, manganese and zinc in 84 samples obtained from 28 stations in the Gulf of Mexico. All samples were oxidized with peroxydisulfuric acid and extracted with diethyldithiocarbamate before activation to remove most of the interferences from the major elements. Wide ranges in concentration were found for all three elements. Coastal values for manganese (0.18-19.0 micrograms/liter) were about a magnitude higher than those in the open sea (0.05-0.88 micrograms/liter). Copper and zinc concentrations were greater in the open sea than in coastal regions. Highest values in the open Gulf were usually found at the surface and at intermediate depths. The higher metal concentrations in the intermediate water appear to originate outside the Gulf of Mexico from release of trace metals by decomposing organisms. Deeper waters were uniformly low in all three elements. (Woodard-USGS)
W72-11656

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02H.
W72-11670

THE DISTRIBUTION OF CO, CR, CU, FE, MN, NI AND ZN IN FRAMVAREN, A NORWEGIAN ANOXIC FJORD,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02K.
W72-11680

SIMULTANEOUS DETERMINATION OF COPPER AND MANGANESE WITH SODIUM DIETHYL DITHIOCARBAMATE,
Bridgeport Univ., Conn. Dept. of Chemistry.
S. M. Shah, and J. Paul.
Microchemical Journal, Vol. 17, No. 1, p 119-124, February 1972. 5 tab, 5 ref.

Descriptors: *Chemical analysis, *Trace elements, *Copper, *Manganese, Separation techniques, Solvent extractions, Copper, Compounds, Chemical reactions, *Pollutant identification, Methodology.
Identifiers: Organic solvents, Carbon tetrachloride, Chloroform, Methyl-isobutyl acetate, Amyl acetate, Diethyl ether, Benzene, Toluene, Perchloric acid, Dithiocarbamate, Complexation, Metal complexes, Isoamyl alcohol, Octanol, Butyl acetate, Isobutyl acetate.

A simple, rapid, and accurate method for the simultaneous determination of Cu and Mn in the presence of each other involves the selective formation of copper diethyl dithiocarbamate complex, at pH less than 1.0, in the presence of perchloric acid and sodium diethyl dithiocarbamate, and the solvent extraction of the Cu complex with n-butyl acetate. The separated aqueous layer is then neutralized with ammonia solution followed by formation of the manganese diethyl dithiocarbamate complex and subsequent extraction of this complex with isobutyl acetate in the presence of perchlorate ions. Composite tables are included showing the efficiency of extraction and the stability of the complexes in selected organic solvents. (Mackan-Battelle)
W72-11696

APPLICATION OF DIFFERENTIAL THERMAL ANALYSIS TO ORGANIC ELEMENTAL MICROANALYSIS: 1. COMBINATION WITH CARBON AND HYDROGEN DETERMINATION APPARATUS,
Shionogi Research Lab., Osaka (Japan).
T. Ieki, and K. Daikatsu.
Microchemical Journal, Vol. 17, No. 1, p 93-104, February 1972. 9 fig, 7 ref.

Descriptors: *Carbon, *Hydrogen, *Differential thermal analysis, Water analysis, Oxidation, Dehydration, Copper sulfate, Gravimetric analysis, Sublimation, Boiling, Organic compounds, Thermal properties.
Identifiers: Vaporization, Benzoic acid, Sucrose, Zygosporin A, Fusion, *Microanalysis, Decomposition products, Thermal decomposition.

Differential thermal analysis (DTA) has been applied to the microdetermination of carbon and hydrogen whereby samples are slowly heated normally at 15 C/min in a quartz vessel on a thermocouple detector in an air stream and carbon-hydrogen values are determined gravimetrically. During heating, thermal characteristics of the sample are indicated as the exothermic peak or endothermic negative peak in a differential thermogram. Differential thermocouples are placed in the layer of oxidizing catalyst and also in water and carbon dioxide absorption tubes to monitor the combustion of organic vapor in the effluent gas. This is not a rapid process but is valuable for samples that give anomalous results with more conventional carbon and hydrogen techniques. This technique also enables an estimation of the decomposition product of the sample at a certain temperature where the DTA indicated a thermal change in the thermogram. (Mortland-Battelle)
W72-11698

TITRIMETRIC MICRODETERMINATION OF YTTRIUM AND SCANDIUM: DISODIUM SALT OF RHODIZONIC ACID AS COMPLEXING AGENT,
Allahabad Univ., (India). Dept. of Chemistry.
O. C. Saxena.
Microchemical Journal, Vol. 17, No. 1, p 68-71, February 1972. 2 tab, 18 ref.

Descriptors: *Metals, *Volumetric analysis, *Trace elements, Potentiometric level, Chelation, Methodology, Chemical reactions, Heavy metals.
Identifiers: *Yttrium, *Scandium, Rare earth metals, Disodium salts, Rhodizonic acid, Mineral acids, Ceric sulfate, Complexing agents, Chemical interference, Metal complexes, Errors, Sample preparation.

In the titrimetric method for the determination of microamounts of yttrium or scandium, a complex is formed between the yttrium or scandium and disodium salt of rhodizonic acid in a 1:3 ratio. The complex is decomposed with a dilute mineral acid and the product titrated against a ceric sulfate solution using N-phenylanthranilic acid as the indicator. The yttrium- or scandium-rhodizonate complexes are formed at pH 4.9. Using this method, yttrium was estimated in the range 72.38 to 179.97 ng per liter and scandium in the range 94.95 to 237.39 ng per liter. Maximum errors were 1.7 and 1.1 percent, respectively. Interference by metal ions was observed. (Mortland-Battelle)
W72-11699

A COLORIMETRIC METHOD OF ESTIMATING HYDROLYZABLE CHLORINE IN LINDANE (GAMMA-HEXACHLOROCYCLOHEXANE),
Central Food Technological Research Inst., Mysore (India).
K. Visweswariah, S. K. Majumder, and M. Jayaram.

Descriptors: *Pollutant identification, *Colorimetry, *Chlorinated hydrocarbon, Pesticides, Organic pesticides, Chemical reactions, Hydrolysis, Chlorine, Acids, Alkalis (Bases), Color reactions.
Identifiers: *Lindane, *Dehydrochlorination, Gamma-hexachlorocyclohexane, Sample preparation, Detection limits, Chemical indicators, Precision, Absorbance.

The techniques for colorimetrically estimating the dehydrochlorination of lindane involved hydrolyzing a quantity of lindane with monethanolamine and mixing the colorless hydrolytic product with a volume of para-nitrobenzenediazonium fluoborate solution. The resulting red solution was read against a reagent blank at 520 millimicrons where it showed maximum absorption. After 15-20 min exposure the color gradually fades. Concentrated nitric, hydrochloric, and sulfuric acids change the complex violet red, while NH4OH, KOH, and Na2CO3 turns it brick red. The method obeys Beer's law between 80 to 320 micrograms/ml of solution and the sensitivity is superior to Volhard's titration method. The insecticide can be estimated in pure form with an accuracy of plus or minus 0.8 to 1.9 percent. (Mackan-Battelle)
W72-11700

IMPROVED TISSUE SOLUBILIZATION FOR ATOMIC ABSORPTION,
Cincinnati Univ., Ohio. Dept. of Environmental Health.
A. J. Jackson, L. M. Michael, and H. J. Schumacher.
Analytical Chemistry, Vol. 44, No. 6, p 1064-1065, May 1972. 3 tab, 13 ref.

Descriptors: *Trace elements, *Chemical analysis, *Spectrophotometry, Zinc, Copper, Iron, Manganese, Aqueous solutions.
Identifiers: *Atomic absorption spectrophotometry, *Biological samples, *Sample preparation, Tissue, Soluene-100, Muscle, Liver, Brain, Plasma, Solubilization, Precision.

Homogeneous, aspiratable tissue samples can be prepared quickly and with minimal handling for analysis by atomic absorption spectrophotometry using Soluene-100, a quaternary ammonium hydroxide tissue solubilizer. Samples prepared by adding 0.5-1.0 ml Soluene/100 mg tissue and allowed to stand at room temperature for 24 hr are analyzed using the AAS additions method. The applicability of the procedure for Zn, Cu, Fe, and Mn analysis was investigated using rat liver, brain, and muscle and rabbit plasma. The same tissue analyzed using standard solutions containing known concentrations of the metals in a Soluene matrix gave values in agreement with those obtained by the method of additions. Precision of Soluene method was calculated to be 5.1 percent and data comparisons show this method to be more sensitive. This method is capable of giving reproducible data with a sample size of 50-100 mg of tissue. Due to the conditions of sample preparation, the sample is likely to be less contaminated and, in addition, one obtains increased sensitivity because of the organic medium. (Snyder-Battelle)
W72-11701

SIMULTANEOUS DETERMINATION OF SAMPLE CONCENTRATION AND REAGENT BLANK,
Hach Chemical Co., Ames, Iowa. Water Analysis Research Lab.
M. B. Kloster, and C. C. Hach.
Analytical Chemistry, Vol. 44, No. 6, p 1061-1064, May 1972. 3 fig, 1 tab, 2 ref.

Descriptors: *Reliability, *Water analysis, *Iron, *Standards, Silica, *Trace elements, Colorimetry, Mathematical studies, Equations, Statistical methods, Chemical analysis, Quality control, Aqueous solutions, Calibrations, *Pollutant identification, Laboratory tests.
Identifiers: *Ultrapure water, Reagents, Ferrozine.

A method is presented for the simultaneous determination of the reagent blank and trace iron in ultrapure water. A calibration curve is prepared for the reagents involved, which allows the ion concentration to be determined simultaneously by running only two rapid and direct colorimetric tests. One ml of acid reagent solution and 1 ml of buffer solution are added to a 50 ml neutral solution and the color is allowed to develop for 1 minute. A purple color with maximum absorbance at 562 nm develops if iron is present. This color may be read and compared to a similarly prepared standard. In basic or acidic solutions, Ferrozine may be formulated for use in trace iron determination. The Ferrozine Color is allowed to develop for 5-10 minutes and is read at 562 nm to determine the mg/l concentration of iron in the solution. Multiplying by the dilution factor gives the mg/l iron in the acid or alkali solution. The method provides a simultaneous check on the reagent while running an analysis, thus providing a continual check on the reliability of a reagent. The method is being extended to iron determinations in reagent grade chemicals and to trace silica determinations. (Mortland-Battelle)
W72-11703

RAPID CHARACTERIZATION OF SALMONELLA ORGANISMS BY MEANS OF PYROLYSIS--GAS-LIQUID CHROMATOGRAPHY,
Public Health Service, Atlanta, Ga. Microbial Chemistry Lab.
E. Reiner, J. J. Hicks, M. M. Ball, and W. J. Martin.
Analytical Chemistry, Vol. 44, No. 6, p 1058-1061, May 1972. 1 fig, 1 tab, 12 ref.

Descriptors: *Salmonella, *Pollutant identifications, Systematics, *Gas chromatography, Drying, Pathogenic bacteria, Cultures, *Enteric bacteria, *Aerobic bacteria.
Identifiers: *Pyrolysis-gas-liquid chromatography, Sample preparation, Pyrolysis, Culture media, Salmonella panama, Salmonella cubana, Salmonella paratyphi var durazzo, Salmonella il-

linois, Salmonella newport, Salmonella bredeney, Salmonella typhimurium, Salmonella chester, Flame ionization gas chromatography.

Fifty-four driedipellet samples of Salmonella were characterized by pyrolysis-gas-liquid chromatography (PGLC). Pyrochromatograms were recorded from gas chromatographs equipped with a flame ionization detector and a pyrolysis module. Standard biochemical and serological aseptic techniques were used in preparing the samples for analysis. Classification of the organisms was performed visually by superimposing respective pyrochromatograms over a light box. All fifty-four samples were correctly classified by comparing their PGLC tracings. (Snyder-Battelle)
W72-11704

SENSITIVITY OF DETECTION OF THE ELEMENTS BY PHOTOELECTRON SPECTROMETRY,
Shell Development Co., Emeryville, Calif.
C. D. Wagner.
Analytical Chemistry, Vol. 44, No. 6, p 1050-1053, May 1972. 4 fig, 2 tab, 5 ref.

Descriptors: *X-ray analysis, Metals, Molybedenum, *Sodium compounds, *Fluorine, Carbon, Oxygen, Nitrogen, Sodium, Magnesium, Aluminum, Phosphorus, Sulfur, Lead, Chlorine, Potassium, Calcium, Chromium, Manganese, Iron, Nickel, Zinc, Cadmium, Iodine, Strontium, Spectrometers, Titanium, Bromine, Boron.
Identifiers: *Atomic sensitivity, *X-ray photoelectron spectrometry, *Chemical elements, Sample preparation, Lithium, Germanium, Arsenic, Selenium, Rubidium, Rhodium, Antimony, Barium, Samarium, Hafnium, Tungsten, Rhenium, Iridium, Platinum, Bismuth, Uranium, Spectrometry, Sensitivity, Fluorine compounds.

In the application of x-ray photoelectron spectrometry to a variety of solid-state systems, it is important to obtain knowledge of the relative sensitivity of detection of the elements. The sensitivity of 43 elements has been determined experimentally by examining the spectra of a variety of sodium and fluorine compounds with a Varian spectrometer. Compounds of the highest commercial purity were ground and sifted to a powder of less than 150 microns. This was brushed upon a sample cylinder and placed within the vacuum chamber of the instrument without access to air. The spectrometer was used with an aluminum anode, with the analyzer set to detect retarded electrons of 100 volts energy. Spectral scanning was done by varying the retarding energy in steps. Relative sensitivities are tabulated by peak heights and areas. Those factors affecting sensitivity and intensity are discussed. (Mackan-Battelle)
W72-11705

DIRECT STEADY STATE CALIBRATION OF A FLAME IONIZATION DETECTOR,
Rice Univ., Houston, Tex. Dept. of Chemical Engineering.
G. F. Carruth, and R. Kobayashi.
Analytical Chemistry, Vol. 44, No. 6, p 1047-1050, May 1972. 2 fig, 2 tab, 17 ref.

Descriptors: *Calibrations, *Laboratory equipment, Flow rates, Instrumentation, Equations, Least squares method, Gases, Liquids, Organic compounds.
Identifiers: *Flame ionization detectors, *Ethane, Hexane, *Butane, Pentane, Heptane, Octane, Nonane, Decane, Relative molar responses, *Aliphatic hydrocarbons, Paraffins, Precision, *Propane.

Calibration responses over wide concentration ranges of n-paraffin hydrocarbons, ethane through n-decane, in a helium carrier gas, were determined by a steady state flow method. Calibration mixtures were prepared by accurately metering known flow rates of the hydrocarbon into the carrier gas by use of a newly designed 8 cu cm positive displacement micropump rated to 5000 psi. The amount of hydrocarbon passing the detector per unit time was determined with a Barber-Colman hydrogen flame ionization detector (FID), with a 1-cm diameter platimum ring as an ion collector. Ethane, propane, and butane were metered as vapors and the other hydrocarbons as liquids. Calibration data for each compound are tabulated and comparisons of collected data and calculated data (expected results), displayed as molar flow rate vs. signal current, yield an average standard deviation of 1.8 percent (maximum deviation of any single point was less than 5 percent). The conclusion is that the uncertainty of this calibration technique is considerably less than the uncertainty in current measuring systems presently available. (Mackan-Battelle)
W72-11706

TURBIDIMETRY VIA PARALLEL PHOTOMETRIC ANALYSIS-DETERMINATION OF SULFATE,
Oak Ridge National Lab., Tenn. Analytical Chemistry Div.
R. L. Coleman, W. D. Shults, M. T. Kelley, and J. A. Dean.
Analytical Chemistry, Vol. 44, No. 6, p 1031-1034, May 1972. 2 fig, 2 tab, 15 ref.

Descriptors: *Sulfates, *Pollutant identification, *Chemical analysis, Laboratory equipment, Water quality control, Turbidity, Optical properties, Physical properties, Phosphates, Automation, Computers.
Identifiers: *Turbidimetry, *Parallel photometry, Barium chloride, 4-amino-4'-chlorodiphenyl hydrochloride, Turbidants, Photomultiplier detector, Orthophosphates, Chemical interference, Detection limits, Absorbance, Precision, Sensitivity.

The utility of the parallel photometric (GeMSAEC) analysis techniques for turbidimetric measurements has been investigated using 2 turbidants-barium chloride, and 4-amino-4-chlorodiphenyl hydrochloride (CAD)-suitable for sulfate analysis. The method employs 15 optical cells located along the periphery of a centrifuge rotor. Samples and reagents are loaded into individual cups arranged in two concentric circles in a transfer disk, with each circle having 15 cups corresponding to the 15 optical cells. The apparatus is aligned and shaped so that the content of the inner cups is transferred radially by centrifugal force through a mixing chamber and into the corresponding cell where optical absorbance is measured and the transmittance of the cells read by a PDP-8/I computer which is interfaced with the GeMSAEC instrument as the cups spin past the photomultiplier detector. The GeMSAEC-CAD procedure allows the determination of sulfate in 0.3 ml with precision and accuracy of about 1 percent at 4 micrograms/ml sulfate. Results can be obtained for 30 samples in less than 1 hour. The CAD procedure has also been found to be free from interference by orthophosphate at concentration levels of less than 500 micrograms/ml orhtophosphate. Precision, accuracy, sensitivity, and speed are generally comparable to spectrophotometric procedures. (Mackan-Battelle)
W72-11708

INTERNATIONAL AFLATOXIN CHECK SAMPLE PROGRAM: 1971 STUDY,
WARF Inst., Inc., Madison, Wis.
F. B. Coon, F. J. Baur, and L. R. L. Symmes.
Journal of the Association of Official Analytical Chemists, Vol. 55, No. 2, p 315-327, 1972, 8 tab, 127 ref.

Descriptors: *Pollutant identification, *Methodology, Evaluation, Quality control, Poisons, Toxins, Peanuts, Food processing industry, Statistical methods, Testing, Sampling.
Identifiers: *Aflatoxins, *Performance evaluation, *Collaborative studies, *Interlaboratory studies, Peanut products, Phytotoxins.

An International Aflatoxin Check Sample Committee was formed in 1971 to establish a check sample program of commodities or materials with aflatoxin contaimination, which would be available to laboratories throughout the world. A set of 4 aflatoxin-contaminated peanut samples was prepared and mailed to 150 participating laboratories. Sufficient data were obtained from this study to permit statistical comparison of 3 of the 4 AOAC methods for analysis of peanuts and peanut commodities. The analysis showed significantly higher means for the CB method than for the BF or Pons method for 2 of the samples examined. (Mackan-Battelle)
W72-11709

UTILIZATION OF THE WESTOO PROCEDURE FOR THE DETERMINATION OF METHYL MERCURY IN FISH BY GAS-LIQUID CHROMATOGRAPHY,
Food and Drug Administration, Washington, D.C. Div. of Chemical Technology.
L. R. Kamps, and B. McMahon.
Journal of the Association of Official Analytical Chemists, Vol. 55, No. 3, p 590-595, May 1972. 1 fig, 3 tab, 8 ref.

Descriptors: *Fish, *Mercury, *Gas chromatography, Separation techniques, Solvent extractions, Methodology.
Identifiers: *Methyl mercury, *Gas liquid chromatography, Cleanup, Electron capture gas chromatography, Mercury chloride, Swordfish, Tuna, Tissue, Biological samples, Detection limits, Mercury compounds, Sample preparation.

The analytical procedure developed by Westoo for the GLC determination of methyl mercury in fish utilizes HCl to provide cleanup and to partition the benzene solution in order to extract the methyl mercury chloride. After the cysteine layer is separated and acidified, the methyl mercury chloride is re-extracted into benzene. Gas-liquid chromatography is then used for final analysis of the benzene solution. This step requires calculation of the g sample/ml available since aliquots are used in the various steps and a further calculation is used to compensate for incomplete partitioning. The normal detection limit of the method is 0.08 ppm methyl mercury chloride with provisions for detecting as little as 0.02 ppm. (Mortland-Battelle)
W72-11710

RAPID SEMIMICRO METHOD FOR THE DETERMINATION OF METHYL MERCURY IN FISH TISSUE,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
J. F. Uthe, J. Solomon, and B. Grift.
Journal of the Association of Official Analytical Chemists, Vol 55, No 3, p 583-589, May 1972. 3 fig, 3 tab, 15 ref.

Descriptors: *Fish, *Mercury, *Pollutant identification, *Gas chromatography, Mink, Pikes, Eels, Salmon, Crabs, Crustaceans, Herrings, Lake trout, Rainbow trout, Separation techniques, Aquatic animals, Solvent extractions, Sharks, Walleye, Marine animals, Heavy metals, Methodology.
Identifiers: *Methyl mercury, Mercury compounds, Thin layer chromatography, Demethylase, Seals (Animal), Cleanup, Florisil, Biological magnification, Tullibee, Whitefish, Tuna, Dogfish, Mercury chloride, Electron capture detector, Muscle, Tissue, Whales, Coho salmon, Northern pike, Liver, Column chromatography, Chemical interference, Sample preparation, Organic solvents, Biological samples, Electron capture gas chromatography.

A procedure for determining methyl mercury in fish tissue involves extracting the methyl mercury into toluene as methyl mercuric bromide, partitioning the bromide into aqueous ethanol as a thiosulfate complex, and re-extracting into benzene as methyl mercuric iodide. Gas chro-

matography is then used to quantitate methyl mercury with a sensitivity of 0.01 ppm. Thin-layer chromatography and gas chromatography of the thin-layer spot were used to detect methyl mercury in the final extract. Comparisons were made of methyl and total mercury in tissues of various aquatic animals; the high levels of nonmethyl mercury in seals suggest that demethylase is present. None of the mercurial compounds tested interfered with the analysis. However, some samples required additional changes by column chromatography on Florisil; 3 M potassium iodide was injected intermittently to keep the column operational. Use of the concentric tube electron capture detector was recommended because of column bleed and resulting detector contamination. (Mortland-Battelle)
W72-11711

SELECTIVE DETECTION OF CHLORINATED INSECTICIDES IN THE PRESENCE OF POLYCHLORINATED BIPHENYLS,
Purdue Univ., Lafayette, Ind. Dept. of Entomology.
J. W. Dolan, R. C. Hall, and T. M. Todd.
Journal of the Association of Official Analytical Chemists, Vol 55, No 3, p 537-538, May 1972. 2 fig, 12 ref.

Descriptors: *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, *Gas chromatography, Conductivity, Heptachlor, Aldrin, DDT, Dieldrin, Selectivity, *Pollutant identification, *Insecticides.
Identifiers: Conductivity detector, Lindane, Chemical interference, Aroclor 1221, Aroclor 1254, Aroclor 1260, p p' DDT.

A gas chromatographic method for selectively detecting chlorinated insecticides in the presence of polychlorinated biphenyls utilized a gas chromatograph equipped with a Coulson electrolytic conductivity detector modified to allow precise control of reaction gas composition and quantity as well as furnace temperature. The glass column, containing 3 percent OV-1 on acid-washed 80-100 mesh Chromosorb W was operated at 225 C with the transfer and inlet line maintained at 240 C. Nitrogen carrier gas was used at an inlet pressure of 40 psig and a flow rate of 40 ml/min. The reaction gases were nitrogen and hydrogen at 40 psig and a combined flow rate of 80 ml/min. After experimentation with varying conditions, the greatest selectivity of insecticides in the presence of PCB was found at a furnace temperature of 600 C and hydrogen reaction gas flow of 1-2 ml/min. (Mortland-Battelle)
W72-11712

CONFIRMATION OF PESTICIDE RESIDUE IDENTITY. I. DERIVATIVE FORMATION FOR THE CONFIRMATION OF PHOTOPRODUCTS OF ENDRIN: HEXACHLORO- AND PENTACHLORO-KETONE PESTICIDE RESIDUES BY GAS CHROMATOGRAPHY,
Department of the Environment, Burlington (Ontario). Water Quality Div.
A. S. Y. Chau.
Journal of the Association of Official Analytical Chemists, Vol 55, No 3, p 519-525, May 1972. 3 fig, 1 tab, 28 ref.

Descriptors: *Pesticide residues, *Endrin, *Pollutant identification, Water analysis, *Chlorinated hydrocarbon pesticides, *Gas chromatography, Fish, Mud, Heptachlor, Aldrin, DDD, DDE, Dieldrin, DDT, Alcohols, Solvent extractions, Chemical reactions.
Identifiers: *Ketones, Hexachlor-ketone, Pentachloro-ketone, Chlorochlordane, Ketone I, Ketone II, Sample preparation, Hydroxochlordene, Lindane, Acetoxychlordene, DDMU, Endosulfan, Methoxychlor, o p'-DDD, Dicofol, 1-Acetoxychlorodene, Heptachlor epoxide, o p'-DDE, DDMU, gamma-Chlordane, alpha-Chlordane, p p'-DDE, o p'-DDD, Chlordane, o p'-DDT, p p'-DDD, p p'-DDT, p p'-Methoxychlor, Photodieldrin, Silylation, Acetylation, Cleanup, Metabolites, Tissue, Chromous chloride, Chemical interference, Photoisomers.

A derivation procedure for the confirmation of two photoproducts of endrin, ketone I and II, using an alkali reaction avoids confusion with the identification of endrin pesticide residues. The ketones are treated with potassium t-butoxide in t-butanol and then silylated or acetylated to the corresponding silyl ether or acetate. The hydroxyl products and the unreacted endrin all have significantly different retention times and can be easily differentiated. The procedure can be used to identify residues as low as 0.02-0.03 ppb in a 25 g fish sample or 0.01 ppb in a 1 liter water extract. The presence of other common organochlorine pesticides does not interfere with this confirmatory procedure. Those that do not react under the described conditions have different retention times than the endrin derivatives. Compounds that do react are: p,p' - methoxychlor, p,p' - DDT, p,p' - DDD, o,p' - DDT, o,p' - DDD, gamma-chlordane, alpha-chlordane, heptachlor, and to a lesser extent, heptachlor epoxide. The use of chromous chloride to confirm these residues is discussed and data are given for gas-liquid chromatographic analysis of some organochlorine pesticides and their derivatives. (Mortland-Battelle)
W72-11713

SOIL MOISTURE INFLUENCE ON TREATMENT AND EXTRACTION OF DDT FROM SOILS,
Agricultural Research Service, Beltsville, Md. Maryland Plant Science Research Div.
R. G. Nash, and W. G. Harris.
Journal of the Association of Official Analytical Chemists, Vol 55, No 3, p 532-536, May 1972. 2 fig, 3 tab, 16 ref.

Descriptors: *DDT, *Separation techniques, *Soil analysis, *Soil moisture, Soils, Alkaline soils, Clays, Chlorinated hydrocarbon pesticides, Gas chromatography, Soil treatment, Moisture content.
Identifiers: Liquid scintillation, *Gas liquid chromatography, Metabolites.

Techniques were investigated in order to prevent the conversion of DDT to DDE during extraction of DDT treatment of highly alkaline soils. Three different extraction methods were used on soils having a wide range of pH values and treated in either a moist or dry condition. Data indicated a tendency for heat and time to convert DDT to DDE during extraction whereas moistening the soils reduced conversion. The development of a new column extraction method prevented further conversion. This method was quicker than Soxhlet or shake extraction and used less expensive equipment but was not as efficient. With column extraction, about 4 percent DDT remained after extraction of incubated soils compared to about one percent after Soxhlet extraction. For clay soils both methods were inefficient. It was concluded that alkaline soils, if equilibrated in a moist condition, can apparently be extracted safely with either Soxhlet or column extraction. (Mortland-Battelle)
W72-11714

THIN LIQUID INFRARED CELL FOR QUANTITATIVE STUDIES USING AQUEOUS SOLUTIONS,
General Technologies Corp., Reston, Va.
E. F. Rissmann.
Analytical Chemistry, Vol 44, No 3, p 644-646, March 1972. 4 fig, 7 ref.

Descriptors: *Laboratory equipment, *Aqueous solutions, *Sulfates, *Nitrates, Nitrites, *Ions, Calcium compounds, Inorganic compounds, Chemical analysis, Calibrations, Reliability.
Identifiers: *Infrared spectrometry, Absorbance, Sulfites.

Two sample cells have been designed for quantitative infrared spectrometric analysis using aqueous solutions. The cells, a sealed and a demountable one, consist basically of two Irtran 2 plates, the bottom one of which is coated with a 3-micron thick silver film which serves as a cell spacer. The flat, top plate prevents voids or bubbles and is transparent enough to see such artifacts if present. Both types of cells have been used to obtain calibration curves of absorbance at specific frequencies versus concentration for solutions of calcium nitrate and nitrite in water and calcium sulfate, sulfite, nitrate and nitrite in saturated aqueous tetrasodium EDTA solution. There is little scatter and good reproducibility of the results. Such cells should make it possible to analyze for several inorganic ions of the type recently given by other investigators for sulfate in EDTA solutions and in applying the IR method to the study of reaction kinetics in aqueous solutions. (Mackan-Battelle)
W72-11715

CHANGES IN ORGANOCHLORINE CONTAMINATION OF THE MARINE ENVIRONMENT OF EASTERN BRITAIN MONITORED BY SHAG EGGS,
Durham Univ. (England). Dept. of Zoology.
J. C. Coulson, I. R. Deans, G. R. Potts, J. Robinson, and A. N. Crabtree.
Nature, Vol 236, No 5348, p 454-456, April 28, 1972. 2 fig, 1 tab, 12 ref.

Descriptors: *Sea water, *Bird eggs, *Monitoring, *Chlorinated hydrocarbon pesticides, *Pollutant identification, Aquatic environment, Water pollution sources, DDE, Dieldrin, Water birds, Incubation, Ecosystems, Bioassay, Water pollution, Trophic level.
Identifiers: *Shag, p p'DDE, Seabirds, Phalacrocorax aristotelis, Metabolites, Biological samples, Bioaccumulation.

Changes in organochlorine contamination of the marine environment of eastern Britain were monitored using shag eggs which were collected at representative locations and at different dates during the breeding season, incubated, and the concentrations of organochlorine insecticides determined. During 1964 to 1971, only dieldrin and p,p'-DDE were recorded because the amounts of the others were not analytically significant. The data collected show that during the periods 1964-1971, significant changes in the concentrations of dieldrin occurred in the eggs of shags in eastern Britain. There were a short-lived decrease in the concentrations of both dieldrin and p,p'-DDE recorded in 1968, followed by a significant increase in 1969. The changes in the concentrations of these two organochlorine compounds in the eggs of shags are of particular interest in relation to attempts to establish mathematical models for the behavior of such compounds in ecosystems. The significant declines of the concentrations in recent years are particularly noteworthy as the shag is a member of the fourth trophic level, and the decline of the concentration of p,p'-DDE is inconsistent with the model prepared by Harrison et al. which predicts no decrease in DDT concentration in animals at the top of the trophic structure even if no further quantities of this substance are added to the biosphere. (Byrd-Battelle)
W72-11721

SOME ATHECATE HYDROIDS FROM THE SHELF WATERS OF NORTHERN CANADA,
National Museum of Natural Sciences, Ottawa (Ontario).
D. R. Calder.
Journal of the Fisheries Research Board of Canada, Vol 29, No 3, p 217-228, March 1972. 16 fig, 1 tab, 20 ref.

Descriptors: *Systematics, *Aquatic life, Marine animals, *Canada, Alaska, Invertebrates, Benthos, Distribution patterns, Spatial distribution.

Identifiers: *Hydroids, Coelentrates, Macroinvertebrates, Euphysa, Corymorpha groenlandica, Tubularia regalis, Monocoryne gigantea, Myriothela phrygia, Coryne hincksi, Cornye pusilla, Sarsia tubulosa, Rhizogeton nudus, Hydractinia carica, Hydractinia monocarpa, Rhizorhagium roseum, Eudendrium arbusculum, Eudendrium capillare, Eudendrium rameum, Eudendrium tenellum.

Sixteen species of athecate hydroids have been collected and identified from shelf waters of northern Canada between the Strait of Belle Isle and the Alaska-Yukon border. This brings the number of athecate species reported from Canada's north coast to 21, and the total number of hydroid species known from the region to 92. No high-arctic forms were presented, and only eight of the species are panarctic or low-arctic in distribution. Of the remaining species, six occur in boreal as well as subarctic waters, and two have a wide latitudinal range. Five species, Corymorpha groenlandica, Tubularia regalis, Monocoryne gigantea, Rhizogeton nudus, and Hydractinia monocarpa, are recored in North American waters for the first time. These five, plus Myriothela phrygia, Eudendrium capillare, and the hydroid of Euphysa, are new records for northern Canada. (Mackan-Battelle)
W72-11723

THE CONTRIBUTION OF GAS CHROMATOGRAPHY TO THE IDENTIFICATION OF SUBSTANCES,
Akademiya Nauk SSSR, Moscow. Institut Fizicheskoi Khimii.
For primary bibliographic entry see Field 02K.
W72-11725

FLAME IONISATION DETECTION (FLAME IONISATION PHENOMENA),
Ceskoslovenska Akademia Ved, Brno. Ustav Instrumentalni Analyticke Chemie.
For primary bibliographic entry see Field 02K.
W72-11726

REPORT ON HAZARDOUS SUBSTANCES,
Food and Drug Administration, Washington, D.C. Office of Product Safety.
For primary bibliographic entry see Field 07B.
W72-11728

ANALYSES OF BENTHIC COMMUNITY STRUCTURE IN A RESERVOIR BY USE OF DIVERSITY INDICES,
Kansas State Teachers Coll., Emporia.
For primary bibliographic entry see Field 02H.
W72-11729

THE RAPID DETERMINATION OF TUNGSTEN IN SOILS, STREAM SEDIMENTS, ROCKS AND VEGETATION,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry.
B. F. Quin, and R. R. Brooks.
Analytica Chimica Acta, Vol 58, No 2, p 301-309, February 1972. 4 fig, 3 tab, 10 ref.

Descriptors: *Spectrophotometry, *Chemical analysis, Soils, Sediments, Rocks, Vegetation, Molybdenum, Geochemistry, *Pollutant identification, Water pollution sources, Water quality control, Methodology, Photometry, Leaching, Trace elements, Soil analysis.
Identifiers: *Tungsten, Toluene-3 4 dithiol, Chemical interference, Absorbance, Precision, Sensitivity, Detection limits, Dry ashing.

A rapid spectrophotometric method for the analysis of tungsten in geological and biological materials (soils, stream sediments, rocks, and vegetation) using toluene-3,4 dithiol (dithiol) involves fusing the soil, sediment, and rock samples with potassium hydrogen sulfate before leaching with concentrated HCl, and ashing the vegetation at 500 C before leaching. The remainder of the analytical procedure is identical except for the addition of a tin (II) chloride solution to the soil, sediments, and rock samples for the removal of any possible interference from molybdenum. Tungsten is extracted from the sample solution into a solution of dithiol in isoamyl acetate by heating for several hours and the remaining globule is dissolved in petroleum ether. The absorbance of the complex is measured at 630 nm. Up to 150 soils or 200 ashed plant samples can be analyzed per man day. Sensitivity of the method is 0.2 for soils and 0.01 for plants on a dry weight basis. The coefficient of variation of replicate analyses is better than plus or minus 11 percent in the range 0.2-150 micrograms of tungsten. (Mackan-Battelle)
W72-11730

IDENTIFICATION AND LOCATION OF ACTINOMYCETES IN THE SOUTHERN END OF LAKE MICHIGAN,
Chicago Dept. of Water and Sewers, Ill. Water Purification Div.
L. M. McMillan, S. P. Karshen, and B. F. Willey.
Journal of the American Waters Works Association, Vol. 64, No. 5, p 312-315, May 1972. 9 fig, 12 ref.

Descriptors: *Actinomycetes, *Water pollution sources, *Taste, *Odor, *Water pollution effects, *Pollutant identification, Aquatic fungi, Aquatic bacteria, Population, Aerobic bacteria, Soil bacteria, Ecological distribution, Surfactants, Biological properties, Environmental effects, *Lake Michigan, Electron microscopy, Biodegradation, Cultures, Growth rates.
Identifiers: *Streptomyces longispororuber, Streptomyces griseus, Streptomyces lavendulae, Culture media, Substrate utilization.

The concentrations of actinomycetes in the southern end of Lake Michigan were identified and located. Representative water samples were collected and cultured using specially prepared media and after the isolated, individual colonies of actinomycetes propagated, they were examined microscopically for color, appearance of growth, and odor. They were also examined microscopically for identification of mycelia and spores. The slide culture technique was used to provide undisturbed morphological growth of the organisms, and morphological identifications were made using an electron microscope. Actinomycetes of the genera Streptomyces and Micromonospora were present in Lake Michigan throughout the year, with a peak in the summer months. The maximum concentration of actinomycetes was along and within a mile of the shoreline, with diminishing appearance out to 10 miles. (Byrd-Battelle)
W72-11731

INSTRUMENTATION FOR MEASUREMENT OF WASTEWATER FLOW,
IIT Research Inst., Chicago, Ill.
For primary bibliographic entry see Field 05B.
W72-11732

TOTAL OXYGEN DEMAND: A NEW TOOL FOR WASTEWATER ANALYSIS,
W. N. Wills.
Water Pollution Control Federation, Vol. 9, No. 2, p D-2 - D-3, February 1972. 3 fig, 2 tab.

Descriptors: *Laboratory equipment, *Monitoring, *Sewage effluents, Instrumentation, Biodegradation, Carbohydrates, Water analysis, *Oxygen, Biochemical oxygen demand, Waste water (Pollution), Regression analysis.
Identifiers: *Total oxygen demand analyzer, Total oxygen demand, Substrate utilization.

A description is given for an instrument, the Total Oxygen Demand (TOD) analyzer, which can be used in monitoring oxygen concentrations in wastewater and tests involving the biodegradability of substrates. The TOD analyzer continuously monitors by means of a fuel cell the changes in oxygen concentration in a stream of nitrogen gas. Combustion of the water solution of the sample at 900 C over a platinum catalyst causes a change in oxygen concentration in the gas stream. The change is recorded and compared with the oxygen depletion caused by the combustion of a known compound. All sampling operations are automatic and if all adjustments are correct, the drop size is uniform. At least two peaks are normally obtained for each sample. TOD and BOD data can be correlated very well; the BOD can be estimated from TOD data using regression line equations. TOD caused by filterable material can be readily differentiated from TOD caused by soluble material passing a 4.45-micron filter. (Holoman-Battelle)
W72-11735

THE SEPARATION OF ALIPHATIC AMINES IN DILUTE AQUEOUS SOLUTION BY GAS CHROMATOGRAPHY AND APPLICATION OF THIS TECHNIQUE TO THE QUANTITATIVE ANALYSIS OF TRI- AND DIMETHYLAMINE IN FISH,
Torry Research Station, Aberdeen (Scotland).
J. N. Keay, and R. Hardy.
Journal of the Science of Food and Agriculture, Vol. 23, p 9-19, January 1972. 5 fig, 2 tab, 13 ref.

Descriptors: *Pollutant identification, Food processing industry, Chemical analysis, Nitrogen compounds, Pollutants, *Commercial fish, Separation techniques, *Gas chromatography, Organic compounds, Aqueous solutions.
Identifiers: *Trimethylamine, *Dimethylamine, Food spoilage, Cod, Gadus morhua, Chemical interference, Gas liquid chromatography, Column chromatography, Steam distillation, Sample preparation.

Gas chromatography on an alkaline Dowfax 9N9 column has been found suitable for the qualitative and quantitative analysis of alkylamines in dilute aqueous solution. This method has been used for the easy identification and estimation of methylamines in fish, having special application to trimethylamine (TMA) and dimethylamine (DMA) produced by bacterial reduction of trimethylamine oxide during spoilage of iced fish. Standardization of values for quantitative analysis of TMA and DMA was achieved by gas liquid chromatography and a steam distillation method tested for removal of the amines from fish tissues. After determining the accuracy of the method (up to 98 percent recovery) samples of frozen cod, Gadus morhua, were withdrawn after various freezing periods, steam distilled to remove the amines, and chromatographed for positive quantitative and qualitative analysis. This method not only appears accurate for analysis of methylamines and therefore a useful index of frozen fish spoilage, but also avoids the interference of DMA in the 'picrate' procedure for TMA determination. (Mackan-Battelle)
W72-11736

A NEW MOUNTING MEDIUM FOR DIATOMS,
Bemidji State Coll., Minn. Dept. of Biology.
D. B. Czarnecki, and H. D. Williams.
Transactions American Microscopical Society, Vol. 91, No. 1, p 73, January 1972. 2 ref.

Descriptors: *Diatoms, *Microscopy, Chrysophyta, Aquatic algae.
Identifiers: *Mounting media, Methylene iodide, Toluene, Polystyrene, Slide preparation, Sample preparation.

An improved inexpensive mounting medium, consisting of a mixture of polystyrene and methylene iodide in toluene, has been used in preparing diatom slides. The medium has a refractive index of 1.75 at 24 C and provides for detail resolution exceeding that of Hyrax mounts. For mixing the medium: add 15.75 g of polystyrene in some toluene, allow to stand until clear, then mix in 200 g of methylene iodide. (Synder-Battelle)
W72-11738

5B. Sources of Pollution

NONDESTRUCTIVE DETERMINATION OF ELEMENTS IN SPECIFIC FRESHWATER MICROPLANKTON BY ACTIVATION ANALYSIS,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 05A.
W72-11093

TOXICITY OF PETROCHEMICALS IN THE AQUATIC ENVIRONMENT,
Texas Univ., Austin. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05C.
W72-11105

MODES OF OCCURRENCE OF LEAD AND ZINC IN CHELEKEN THERMAL BRINES (O FORMAKH NAKHOZHDENIYA SVINTSA I TSINKA V TERMAL'NYKH RASSOLAKH CHELEKENA),
Akademiya Nauk SSSR, Moscow. Institut Geologii Rudnykh Mestorozhdenii Petrografii, Mineralogii i Geokhimii.
For primary bibliographic entry see Field 02K.
W72-11118

ISOTOPIC COMPOSITION OF SULFATES IN NATURAL WATERS FROM SULFIDE DEPOSITS IN THE MIDDLE URALS (O VOZMOZHNOSTI ISPOL'ZOVANIYA IZOTOPNOGO SOSTAVA SUL'FATNOY SERY PRIRODNYKH VOD V KACHESTVE POISKOVOGO PRIZNAKA KOLCHEDANNOGO ORUDENENIYA NA SR EDNEM URALE),
Uralskoe Geologicheskoe Upravlenie, Sverdlovsk (USSR).
For primary bibliographic entry see Field 02K.
W72-11119

JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
F. G. Barber, G. Godin, and T. S. Murty.
Canada Department of the Environment, Marine Sciences Branch Manuscript Report Series No 24, 1972. 193 p.

Descriptors: *Bays, *Water circulation, *Tides, *Oceanography, *Canada, Hydrologic data, Data collections, Estuaries, Investigations, Water temperature, Salinity, Currents (Water), Ice, Atlantic Ocean, Rivers, Inflow, Winds, Hydroelectric plants, Water pollution sources, Forecasting.
Identifiers: *James Bay (Canada), Hudson Bay.

The 3 reports in this publication were prepared in response to a request to Federal authorities from the government of the Province of Quebec for an initial consideration of the possible influence of the James Bay Hydroelectric Project on the marine environment. The data include water circulation, temperatures, salinity distribution, ice effects, winds, tidal effects, and river inflow. The reports are entitled: 1. On the Oceanography of James Bay; 2. The Tides of James Bay; and 3. Circulation in James Bay. (See W72-11132 thru W72-11134) (Woodard-USGS)
W72-11131

ON THE OCEANOGRAPHY OF JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
F. G. Barber.
In: Canada Department of the Environment, Marine Sciences Branch Manuscript Report Series No 24, p 1-96, 1972. 24 fig, 4 tab, 80 ref.

Descriptors: *Bays, *Hydrologic data, *Water circulation, *Canada, Water temperature, Salinity, Estuaries, Reviews, Rivers, Inflow, Currents (Water), Tides, Ice, Atlantic Ocean, Oceanography.
Identifiers: *James Bay (Canada), Hudson Bay.

Certain aspects of the oceanography of James Bay (Canada) were examined for possible influence on the water with the development of the hydroelectric potential there. The work constitutes a review or reappraisal of knowledge of the region. The review emphasizes the importance to James Bay of processes operating in adjacent waters and the fact that all of these waters generally reflect to similar degree the influence of similar internal and external factors. The water reflects to a large extent an influence of the Atlantic Ocean and an influence of a process occurring within the system. Much of the water is less than oceanic salinity, specifically less than 24.7 salinity, so that a point of maximum density can occur at temperatures warmer than that of ice formation at the surface. At such low salinities, surface cooling at temperatures close to freezing would lead to stability. Furthermore, at those locations where the surface layer is fresh or nearly so, the amount of salt made available to the surface layer through freezing is negligible. (See also W72-11131) (Woodard-USGS)
W72-11132

THE TIDES IN JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
G. Godin.
In: Canada Department of the Environment, Marine Sciences Branch Manuscript Report Series No 24, p 97-142, 1972. 11 fig, 4 tab, 3 ref, append.

Descriptors: *Tides, *Bays, *Estuaries, *Canada, *Data collections, Currents (Water), Diurnal, Flow profiles, Tidal effects, Water level fluctuations, Gages, Measurement.
Identifiers: *James Bay (Canada), Hudson Bay.

The amplitude and phase of the major constituents of the tide observed at various gage stations in James Bay (Canada) are tabulated. The tidal wave which progresses along the southern rim of Hudson Bay is strongly refracted around Cape Henrietta Maria and enters James Bay as a damped progressive wave. Its advance is considerably retarded in the vicinity of Akimiski Island and reaches Hannah Bay and Rupert Bay seven hours after it has rounded Cape Henrietta Maria. Its amplitude is larger on the western and southern portions of the bay due to the presence of a degenerate node of the semidiurnal tide on the eastern side of the bay. The mean amplitude of the tide varies from over 90 cm in the western and southern portions to less than 40 cm in the eastern portions near Akimiski Island. (See also W72-11131) (Woodard-USGS)
W72-11133

CIRCULATION IN JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
T. S. Murty.
In: Canada Department of the Environment, Marine Sciences Branch Manuscript Report Series No 24, p 143-193, 1972. 7 fig, 1 tab, 23 ref.

Descriptors: *Water circulation, *Bays, *Currents (Water), *Canada, *Estuaries, Model studies, Winds, Storms, Water temperature, Thermocline, Investigations, Forecasting, Hydroelectric plants, Data collections, Theoretical analysis, Environmental effects, Water pollution sources, Thermal pollution.
Identifiers: *James Bay (Canada).

The interest on physical oceanographic problems of James Bay (Canada), arose in connection with the proposed hydroelectric power project on some rivers draining into the bay. The normal modes of response of James Bay are calculated using a one dimensional topographic model. Using the method of characteristics it is shown that at the southern shores of James Bay the storm surge amplitude could reach up to 19 feet. The thermohaline circulation can be as intense as the wind-generated circulation which may explain some of the anomalous ice drift patterns. Although no barotropic coastal jets appear to be possible, baroclinic coastal jets with a width of 7 kilometers can occur with the core of the jet being at about 7 km seaward from the position where the thermocline intersects the bottom. The circulation in some rivers draining into James Bay is examined theoretically using the concepts of the three modes of estuarine circulation, namely the river-discharge mode, wind-stress mode, and gravitational-convection mode. The question of atmospheric water balance over these river basins is briefly examined and some possible consequences of the manmade changes are speculated. (See also W72-11131) (Woodard-USGS)
W72-11134

LAND AND WATER POLLUTION FROM RECREATIONAL USE.
National Industrial Pollution Control Council, Washington, D.C.
For primary bibliographic entry see Field 05G.
W72-11188

CLEAN WATER: AFFLUENCE, INFLUENCE, EFFLUENTS, A DESIGN FOR WATER QUALITY MANAGEMENT.

Available from the National Technical Information Service as N71-37861, $3.00 in paper copy, $0.95 in microfiche. ASEE-NASA Research Center and Old Dominion University Research Foundation, Hampton, Va., 1971. 228 p, 26 fig, 26 tab, 166 ref, 18 append. NGT 47-003-028.

Descriptors: *Water pollution, *Water management (Applied), *Systems analysis, *Regional development, Water resources development, Costs, Legal aspects, Rivers, Virginia, Social aspects.
Identifiers: *James River.

A system design analysis is applied to the problem of water pollution in Virginia's James River. First, the problem of declining water quality is outlined and specific obstacles to effective water quality management are identified. Twenty-five separate socio-economic impediments to effective management are identified. In general these impediments include such things as lack of will, misplaced priorities, poor laws, and failure to enforce the law. All of these impediments stem from society's current lack of commitment to clean up the environment. Second, the design of a management system for water resources is outlined, and general recommendations for effective management are developed. The recommendations are applied in a case study of the James River. Finally, 74 specific recommendations concerning approaches to achieving improved water quality are made. These recommendations fall into six broad categories: (1) commitment and enforcement, (2) river basin planning and management, (3) standards and waste treatment, (4) economic considerations, (5) organizational considerations, and (6) special technical considerations. Although based on a case study of the James River, these conclusions are meant to apply generally to the entire country. (Settle-Wisconsin)
W72-11219

DISTRIBUTION OF NATURALLY OCCURRING CHELATORS (HUMIC ACIDS) AND SELECTED TRACE METALS IN SOME WEST COAST FLORIDA STREAMS, 1968-1969,
Florida Dept. of Natural Resources, St. Petersburg.
D. F. Martin, M. T. Doig, III, and R. H. Pierce, Jr.
Professional Papers Series, No 12, April 1971. 52 p, 16 fig, 21 tab, 159 ref.

Descriptors: *Humic acids, *Chelation, *Iron, *Copper, *Manganese, *Zinc, *Water analysis, *Water chemistry, *Red tide, Streams, Rivers, Runoff, Freshwater, Florida, Dinoflagellates, Gymnodinium, Trace elements, Spectroscopy.

Identifiers: *Trace metals, Atomic absorption spectroscopy.

Monthly freshwater samples from 14 west coast Florida streams were collected during 1968-69 and analyzed for selected constituents. Concentrations of humic acids were determined by an extraction procedure that was based upon the operational definition of these materials ('that soil fraction that is soluble in alkali and insoluble in acid and ethanol'). Particulate and soluble forms of iron, copper, manganese, and zinc were determined by means of atomic absorption spectroscopy. In addition, rainfall and riverflow data for appropriate locations were obtained from government sources during the study period. Linear correlation coefficients of humic concentration with rainfall and with trace metal concentrations were obtained for each of the 14 rivers during a 12 month period. The origin, properties, spectra, and structure of humic acids were reviewed, and the biogeochemistry of selected trace metals (iron, zinc, manganese and copper) was considered. It was anticipated that it might be possible to find an association between red tide outbreaks and variations in the stream constituents, especially the distribution of iron and/or naturally occurring chelators. (Svensson-Washington)
W72-11238

LIMITATIONS AND EFFECTS OF WASTE DISPOSAL ON AN OCEAN SHELF.
Florida Ocean Sciences Inst., Deerfield Beach.

Copy available from GPO Sup Doc EP2.10:16070 EFG 12/71, $2.25; microfiche from NTIS as PB-210 862, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, December 1971. 317 p, 151 fig, 27 tab, 24 ref. EPA Program 16070 EFG 12/71.

Descriptors: *Continental shelf, *Florida, *Outlets, *Waste disposal, *Invertebrates, *Recreation, *Sampling, *Sands, *Coliforms, Temperatures, Salinity, Analytical techniques, Dyes, Tracers, Diffusion, Waste dilution, Water quality standards, Fluometry, Currents.
Identifiers: Boca Raton (Fla), Pompano Beach (Fla), Delray (Fla), Sample Fit analysis, Gausian Fit analysis.

A three year study to determine the effects of sewage outfall on macroscopic marine life and human recreation by comparison surveys was made using Boca Raton as a control for the Pompano Beach and Delray, Florida, outfalls. Sand samplings from the sewage lift stations were tested for total fecal and coliform counts, using standard methods. Temperature, salinity and current profiles were done and fluorometric dilution measurements were augmented by Sample Fit Analysis and Gausian Fit Analysis, measuring concentration deviations of the dye tracking of plumes resulting from the rising effluent surface 'boils'. A diffusion model furnished the basis of analysis on the various physical data and charted the fluorometric data. Rules are enumerated for limiting pollution on beaches as set by the state water quality controls. Programmed sampling of effluents and coastal circulation by plume dye tracking and sample collections of coliforms, phosphate and other matter are suggested. (Ensign-PAI)
W72-11275

A HYDROLOGICAL-METAL POLLUTION STUDY, HEATH STEELE MINES AREA, NEW BRUNSWICK, CANADA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
J. E. Charron.
Technical Bulletin No 43, 1972. 47 p, 11 fig, 3 tab, 6 ref.

Descriptors: *Water pollution sources, *Heavy metals, *Mine wastes, *Canada, Zinc, Copper, Water pollution control, Streams, Surface waters, Water analysis, Chemical analysis, Water quality, Streamflow, Flow rates, Sampling, Data collections, Mining.
Identifiers: *New Brunswick (Canada).

Two streams in the Heath Steele Mines area of New Brunswick, Canada, were determined to be affected by metal pollution (Zn and Cu). These streams and the springs of the area are not polluted in their natural environment because the sulfide ore in its natural unbroken state was unoxidized and, therefore, insoluble. The pH of these natural waters ranged from 6.0 to 8.0 while the value of total dissolved solids was low as indicated by specific conductance values of less than 100 micromhos/cm. Therefore, the metal pollution in the Northwest Miramichi River must be caused by the Heath Steele mining operation at the head of the Tomogonops River basin. On the mining property, the extreme values obtained for pH, specific conductance, and copper were 5.0, 3,650 micromhos/cm, and 72.0 ppm, respectively. Metal pollution increased appreciably after heavy precipitation, due mainly to the lack of facilities for transmitting these polluted waters to the tailing pond. If the capacity of pumping and transmitting facilities or the storage capacity were increased immediately, metal pollution resulting from heavy precipitation could be reduced by 85%. (Woodard-USGS)
W72-11300

ANALYSES OF LONG-TERM TRENDS IN WATER-QUALITY PARAMETERS,
Geological Survey, Trenton, N.J. Water Resources Div.
P. W. Anderson, S. D. Faust, and J. S. Zogorski.
Reprint from Proceedings of the 4th American Water Resources Conference, November 18-22, 1968, New York, N Y: American Water Resources Association, Urbana, Ill, p 123-131, 1968. 9 fig, 5 ref.

Descriptors: *Water pollution, *New Jersey, *Dissolved oxygen, Statistics, Statistical methods, Biochemical oxygen demand, Regression analysis, Municipal wastes, Industrial wastes.
Identifiers: *Passaic River (NJ).

The Passaic River basin in northeastern New Jersey affords a unique opportunity for a water-quality trend study. Stream-quality records are available up to 23 years, 1945-67, at 6 mainstream and 10 tributary sampling sites. These data, collected monthly by the Passaic Valley Water Commission, include turbidity, color, odor, pH, hardness, alkalinity, carbon-dioxide, acidity, chloride, nitrate, nitrite, ammonia, temperature, dissolved oxygen, biochemical-oxygen demand, and coliform bacteria. In addition, daily records are collected at a downstream site. The Passaic River drains approximately 950 sq. mi., of which roughly 85 percent is located in northeastern New Jersey. The remainder drains a part of southeastern New York State. The basin is the most widely developed major river system in New Jersey. A set of linear-regression curves derived from observed biochemical-oxygen demand loads and streamflow data are given for three time periods. The biochemical-oxygen demand load at the sampling site is increasing. For example, at the average streamflow of 758 mgd, the river carried a biochemical-oxygen demand load of 10 tons/day in 1951-52, 14 tons/day in 1953-54, and 17 tons/day in 1963-64. Dissolved-oxygen loads decrease with time: the long-term average flow carried 42 tons/day of dissolved oxygen in 1953-54, 31 tons/day in 1959-60, and 24 tons/day in 1965-66. (Knapp-USGS)
W72-11304

BREWERY EFFLUENT CONTROL, COMMENTS ON POLLUTION AND ITS ABATEMENT,
Kappele, Wright MacLeod Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 05D.
W72-11308

PESTICIDE MOBILITY IN SOILS: II. APPLICATIONS OF SOIL THIN-LAYER CHROMATOGRAPHY,
Agricultural Research Service, Beltsville, Md. Plant Science Research Div.
C. S. Helling.
Soil Sci Soc Am Proc. Vol 35, No 5, p 737-743. 1971. Illus.
Identifiers: Adsorption, *Chromatography, *Clays, Diffusion, Dioxins, Herbicides, Insecticides, Leaching, Organic, *Pesticides, Soils, *Surfactants.

Forty pesticides were grouped into 5 categories based on relative mobilities on Hagerstown silty clay loam plates, using soil thin-layer chromatography. Diffusion was also examined in moist and airy-dry soils. Methyl esterification greatly reduced mobility of herbicides while increasing diffusion and volatility. The surfactant Tween 20 (1% in solution) increased 2,4-D movement, but 0.5% solutions of 5 surfactants were relatively ineffective with several herbicides. Metabolites of atrazine, propanil, and 2,4-D were less mobile than their parent compounds. Two chlorinated dibenzo-p-dioxins, potential 2,4,5-T impurities, were immobile. Movement of components in chlorpropham/propham/p-chlorophenyl methylcarbamate and atrazine/propachlor combinations were mutually independent.--Copyright 1972, Biological Abstracts, Inc. (See also W72-11353)
W72-11353

PESTICIDE MOBILITY IN SOILS: III. INFLUENCE OF SOIL PROPERTIES.
Agricultural Research Service, Beltsville, Md. Plant Science Research Div.
C. S. Helling.
Soil Sci Soc Am Proc. Vol 35, No 5, p 743-748. 1971.
Identifiers: *Soil properties, *Pesticides, Adsorption, Capacity, Chromatography, Clays, Dicamba, Fenac, Herbicides, Insecticides, Leaching, Mobility, Moisture, Movement, Picloram, Soils.

Soil parameters influencing pesticide movement were isolated using simple correlation and multiple linear regression analyses. Mobilities of 12 pesticides on 14 soils were first characterized by soil thin-layer chromatograppy. Mobility of nonionic compounds was inversely related to adsorption of similar compounds, field moisture capacity, organic matter and clay contents, and cation-exchange capacity. Mobility of acidic compounds (dicamba, picloram, fenac, and 2,4-D) was directly correlated with soil pH and inversely with picloram adsorption. Pesticide mobility tended to be directly related to increased water flux. When soils were grouped according to their clay mineralogy, there was a tendency for movement of acidic pesticides to be directly related to montmorillonitic clay content and inversely related to nonmontmorillonitic clay content. Regression equations usually contained field moisture capacity, water flux and often simazine or chlorpropham adsorption terms for predicting movement. These parameters are highly correlated with soil organic-matter content, which does not itself appear in the regression equations. The average deviation of predicted from observed mobility, across all soils and pesticide, was 0.04 RF units.--Copyright 1972, Biological Abstracts, Inc. (See also W72-11353)
W72-11354

CLOSTRIDIUM BOTULINUM IN THE GREAT LAKES,
Wisconsin Univ., Madison. Food Research Inst.
For primary bibliographic entry see Field 05C.
W72-11392

DDT IN THE BIOSPHERE: WHERE DOES IT GO.,
Brookhaven National Lab., Upton, N.Y. Dept. of Biology.
G. M. Woodwell, P. P. Craig, and H. A. Johnson.
Science, Vol 174, No 4014, p 1101-1108. 1971. Illus.

Identifiers: *Water pollution sources, Biosphere, Biota, Cycles, *DDT, Hazards.

The worldwide pattern of movement of DDT residues appears to be from the land through the atmosphere into the oceans and into the oceanic abyss. Calculations based on the fragmentary data available on rates of movement and sizes of various pools of DDT residues lead to the conclusion that concentrations in the atmosphere and in the mixed layer of the oceans lag by only a few years behind the amounts of DDT used annually throughout the world. A model suggests that maximum concentrations of DDT residues occurred in air in 1966 and will occur in the mixed layer of the oceans in 1971. The biota probably contains in total less than 1/30 of 1 yr's production of DDT during the mid-1960's, a very small amount in proportion to the total potentially available. The reason for the biota's failure to absorb larger quantities and to be affected much more severely is unclear. The analysis suggests that mere good fortune has protected man and the rest of the biota from much higher concentrations, thus emphasizing the need to determine the details of the movement of DDT residues and other toxins through the biosphere and to move swiftly to bring world use of such toxins under rational control based on firm knowledge of local and worldwide cycles and hazards.--Copyright 1972, Biological Abstracts, Inc.
W72-11423

MERCURY IN A GREENLAND ICE SHEET: EVIDENCE OF RECENT INPUT BY MAN,
Naval Undersea Research and Development Center, San Diego, Calif.
H. V. Weiss, M. Koide, and E. D. Goldberg.
Science, Vol 174, No 4010, p 682-694, 1971.
Identifiers: Greenland, Ice, *Mercury, *Waster pollution sources, Human population.

The increased Hg content in a Greenland ice sheet over the last several decades suggests the dissemination of this element about the earth's atmosphere through the activities of man. The Hg content in the atmosphere appears to result primarily from the degassing of the earth's crust. Increased flux may come about as a result of the enhancement of this degassing process through the actions of man.--Copyright 1972, Biological Abstracts, Inc.
W72-11426

GENERAL STUDY OF CHEMICAL POLLUTANTS THROWN INTO SEA WATER: INVENTORY AND TOXICITY STUDIES,
Institut National de la Sante et de la Recherche Medicale, Nice (France). Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale.
M. Aubert, J. Aubert, J. P. Gambarotta, B. Donnier, and M. Barelli.
Rev Int Oceanogr Med. 4 volumes, 1969.
Identifiers: *Pollutant identification, *Sea water, Water pollution sources, France, Atlantic, Channels, Detergents, Industrial wastes, Inventory, Mediterranean, Methodology, Pesticides, Petroleum, Toxicity, Waste water (Pollution).

An inventory of chemical pollution of French coastal waters is presented in 4 volumes: the first is dedicated to general considerations and methodology, the others describe present pollution in the Mediterranean, Atlantic, Channel and North Sea regions. The results emphasize the need for classical analytic methodology, new techniques and 'biological counters' adapted to this particular problem. Various types of chemical pollutants are surveyed, such as synthetic detergents, petroleum products, pesticides and industrial waste. Some particular cases of widespread pollution are studied. The general experimental considerations developed lead, for the study of industrial waste, to the use of a standardized methodology which demonstrates the phenomena of intervening acute toxicity on the constituents of the marine environment. The possibility of transmitting these toxic effects to the final consumer in the biological chain is also studied. Techniques used to carry out these biological measurements are described in detail, as well as a method for interpreting the results thus obtained. The results are grouped according to zone: Mediterranean, Channel and Atlantic.--Copyright 1972, Biological Abstracts, Inc.
W72-11428

SOIL PROPERTIES AFFECTING THE RETENTION OF PHOSPHORUS FROM EFFLUENT,
Department of Agriculture, Agassiz (British Columbia). Research Station.
M. K. John.
Can J Soil Sci. Vol 51, No 3, p 315-322, 1971.
Identifiers: *Waste water treatment, Aluminum, Canada, Waste disposal, Effluents, Extracts, Iron, New Zealand, *Phosphorus, Retention, Saturation, Sewage, Soils, Texture, Hydrogen ion, Concentration, Soil properties.

Factors affecting removal of P from waste water effluent on 376 soils from British Columbia and 6 soils from New Zealand were studied. When shaken at a ratio of 1:50 soil to effluent, the soils of the dry British Columbia interior removed on an average 31% of the effluent P, whereas wet coastal soils removed 85% and the New Zealand soils removed 76%. The capacity of the soil to remove effluent P was related mostly to Al, Fe and P extracted by various extractants, pH, base saturation, organic matter and texture.--Copyright 1972, Biological Abstracts, Inc.
W72-11430

TRITIUM AND RADIOCARBON IN HAWAIIAN NATURAL WATERS: PART I,
Hawaii Univ., Honolulu. Water Resources Research Center.
T. H. Hufen, R. W. Buddemeier, and L. S. Lau.
Available from the National Technical Information Service as PB-210 916, $3.00 in paper copy, $0.95 in microfiche. Completion Report, No. 53, April 1972. 54 p, 15 fig, 5 tab, 15 ref, 3 append. OWRR B-016-HI (1).

Descriptors: *Radiocarbon, *Tritium, *Isotopes, Groundwater, *Hawaii, *Oahu, Path of pollutants, Pollutant identification, Water wells, Radioactivity.

Instrumentation and procedures for an investigation of the tritium and radiocarbon levels in natural waters on the island of Oahu have been developed, and a number of measurements have been made. Tritium concentrations in rainwater are in excess of natural abundance levels, and fluctuate seasonally. Excess radiocarbon (as HCO3-) and tritium from atmospheric nuclear tests were also found in surface waters from these sources. Samples from nine tunnels into the Koolau Range dike compartments had tritium activities ranging from contemporary to pre-bomb; only two contained excess radiocarbon, however. Basal water samples from wells and shafts generally show little or no tritium and radiocarbon concentrations lower than the dikewater. Three springs discharging perched water show tritium in excess of current rainwater levels, but differ in their radiocarbon activities. In the irrigated Pearl Harbor-Central Oahu area, both radiocarbon and chloride content in well water increase down the gradient toward Pearl Harbor. A saline well T-133 at Ewa Beach was sampled at three different depths. All samples were low in radiocarbon, the activity of which is positively correlated with Cl- but negatively correlated with depth. This suggests exchange between the dissolved HCO3- and the carbonate aquifer.
W72-11438

CHROMIUM IN WATER--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
Available from NTIS, Springfield, Va 22151 as PB-210 921, $3.00 in paper copy, $0.95 in microfiche. Water Resources Scientific Information Center Report WRSIC 72-205, June 1972. 126 p, 83 ref.

Descriptors: *Bibliographies, *Abstracts, *Water pollution sources, *Chromium, *Information retrieval, Publications, Documentation, Indexing, Classification, Information exchange, Data storage and retrieval.

This bibliography, containing 83 abstracts is one in a series of planned bibliographies in water resources produced wholly from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 41,521 abstracts covering SWRA through May 15, 1972 (Volume 5, Number 10). A descriptor index is made up of a fraction of the total descriptors and identifiers by which each paper in this bibliography has been indexed. These descriptors represent weighted terms that best describe the information content and are indicated by asterisks. A comprehensive index represents all of the descriptors and identifiers by which each paper in this bibliography has been indexed. Through permutation, each word in a multiple-word descriptor or identifier is made to file in its normal alphabetic order, thus affording a multiple access to each abstract. Another index lists the authors alphabetically and gives page numbers for the abstracts. Abstracts with full bibliographic details are listed in ascending Accession Number order. (Woodard-USGS)
W72-11442

ALDRIN AND ENDRIN IN WATER--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.

Available from NTIS, Springfield, Va 22151 as PB-210 922, $3.00 in paper copy, $0.95 in microfiche. Water Resources Scientific Information Center Report WRSIC 72-203, 1972. 119 p, 77 ref.

Descriptors: *Bibliographies, *Abstracts, *Water pollution sources, *Aldrin, *Endrin, Pesticides, Publications, Documentation, Information retrieval, Indexing, Classification, Information exchange, Data storage and retrieval.

This bibliography, containing 77 abstracts is one in a series of planned bibliographies in water resources produced wholly from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 37, 916 abstracts covering SWRA through February 15, 1972 (Volume 5, Number 4). Abstracts with full bibliographic details are listed in ascending Accession Number order. A descriptor index is made up of a fraction of the total descriptors and identifiers by which each paper in this bibliography has been indexed. These descriptors represent weighted terms that best describe the information content and are indicated by asterisks. A comprehensive index represents all of the descriptors and identifiers by which each paper in this bibliography has been indexed. Through permutation, each word in a multiple-word descriptor or identifier is made to file in its normal alphabetic order, thus affording a multiple access to each abstract. (Woodard-USGS)
W72-11443

THE AQUEOUS UNDERGROUND,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
L. W. Gelhar.
Technology Review, Vol 74, No 5, p 45-53, March-April 1972. 5 fig, 3 ref.

Descriptors: *Groundwater resources, *Water resources development, *Planning, *Water pollu-

tion control, *Reviews, Water demand, Water supply, Water quality, Hydrogeology, Model studies, Legal aspects, Pollution abatement, Water quality standards, Regulation.

Problems associated with the development of groundwater resources are reviewed. As demands increase on underground sources, the need for fundamental knowledge as well as understanding of many local geologic details becomes apparent. With the gradual development of water-reclamation schemes based on the recharge of aquifers, the water-quality aspects of artificial recharge are becoming important. Although groundwater is generally protected from gross pollution, low-level contamination which may present a hazard in drinking water is now common. The contamination increases gradually, reflecting the slow movement in the aquifer, and is thus less dramatic than surface-water pollution. Thus it is more insidious--and potentially just as serious. Future developments and management of the system will require, as a basis, information on the long-term response of the aquifer system to possible hydrologic changes. An effective program to control groundwater pollution might comprise measures ranging from public information programs to total bans on certain hazardous materials and might include strict controls on subsurface disposal practices and land use. (Woodard-USGS)
W72-11466

SUBSURFACE POLLUTION PROBLEMS IN THE UNITED STATES,
Environmental Protection Agency, Washington, D.C. Fresh Water Pollution Control Section.
R. K. Ballentine, S. R. Reznek, and C. W. Hall.
Available from NTIS, Springfield, Va. 22151 as PB-210 923, $3.00 in paper copy, $0.95 microfiche. Environmental Protection Agency Technical Studies Report TS-00-72-02, May 1972. 29 p, 5 fig, 6 ref, 2 append.

Descriptors: *Water pollution sources, *Water pollution effects, *Groundwater, *United States, Reviews, Water demand, Projections, Injection wells, Septic tanks, Landfills, Pesticides, Fertilizers, Saline water intrusion, Water pollution control, Water supply, Water utilization.

Sources of subsurface water contamination can generally be assigned to one of three basic categories: (1) the direct introduction of pollutants deep within the earth by injection through wells; (2) percolation of pollutants from surface and near surface sources such as septic tanks, leaching ponds, sanitary landfills, and pesticides and fertilizers used in agricultural practices; and (3) intrusion of salt water into fresh-water aquifers as a result of reductions in fresh-water flow in coastal areas or the breaching of impervious strata in inland areas. These pollution problems are reviewed concerning the increasing demands for water of acceptable quality for the various types of water needs in the United States. (Woodard-USGS)
W72-11472

EFFLUENTS FROM FRUIT AND VEGETABLE PROCESSING-PART I,
For primary bibliographic entry see Field 05D.
W72-11608

EFFLUENTS FROM FRUIT AND VEGETABLE PROCESSING-CONCLUSION,
For primary bibliographic entry see Field 05D.
W72-11609

THE CONTROL AND REMOVAL OF MATERIALS OF ECOLOGICAL IMPORTANCE FROM WASTEWATERS IN LOS ANGELES, CALIFORNIA, U. S. A.,
Los Angeles Bureau of Sanitation, Calif.
R. D. Bargman, and W. F. Garber.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 9, Hall B, Paper No. 17, June 21, 1972. 9 p, 1 fig, 4 tab, 2 ref.

Descriptors: *Water quality control, *Inspection, *Sampling, *Monitoring, *California, Data processing, Industrial wastes, Instrumentation, Laboratory tests, Heavy metals, Toxicity, Chlorinated hydrocarbon pesticides, Mercury, Pollutant identification, Water pollution sources.
Identifiers: *Fats and oils, *Los Angeles (Calif).

The City of Los Angeles has developed an entire section of the wastewater department for the specific tasks of characterizing waste discharges from industries and identifying, with the help of laboratory back-up personnel, any materials of ecological significance. The 13,000 industrial waste discharge permits are arranged by type of industry, and a data processing bank drawn from the permit file allows information to be categorized in the following ways: (1) by waste processing; (2) by treatment done or necessary; (3) by inspection frequency; (4) by industrial wastes control district; (5) by receiving waters-sewers, storm drain, ocean; (6) by flow characteristics; (7) by industrial class; (8) by specific element or waste type; and (9) by other characteristics as the need becomes apparent. By such a refined system of data processing, source control of compounds, even in the part per billion range, is now possible. Case histories of such instances are presented to illustrate the applications of the system. (Lowry-Texas)
W72-11624

COMPARISON OF DISCHARGES FROM URBAN STORMWATER RUNOFF, MIXED STORM OVERFLOW AND TREATED SEWAGE,
Allmanna Ingenjorsbyran, Stockholm (Sweden).
For primary bibliographic entry see Field 05D.
W72-11638

QUALITY OF STORMWATER DRAINAGE FROM URBAN LAND,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
E. H. Bryan.
Water Resources Bulletin, Vol 8, No 3, p 578-588, June 1972. 1 fig. 7 tab, 12 ref.

Descriptors: *Water pollution sources, *Urban runoff, Urban hydrology, Storm runoff, Organic matter, Chemical oxygen demand, Urban drainage, Urbanization, Water quality, Water pollution effects, *North Carolina.
Identifiers: *Durham (NC).

Urban stormwater from a 1,067-acre drainage basin in Durham, N.C. was characterized to determine yield of pollutants. Population density averaged 9 persons per acre. Annual BOD contribution attributable to surface wash during storms was approximately equal to contribution by its secondary wastewater treatment plant effluent. Total organic matter exceeded the amount in raw sanitary sewage from a residentially developed area of the same size. Mean basin yields (lb/acre/day) were: BOD-0.23, COD-2.85, Total Solids-43.6, Volatile Total Solids-4.8, Total Phosphate-0.01 and Chloride-0.20 (as NaCl). The yield of lead presumed to originate from internal combustion engines operating on and near the basin was 0.006 lb/acre/day. The concentration of total pesticides weighted for flow significance was 1.2 parts per billion. The major long-term pollutional impact on a projected downstream reservoir was considered to be the fixed solids residue and long-term oxygen demand. Intermittent release of other pollutants in slugs during runoff periods may be a significant factor in causing undesirable effects in streams draining urban areas. (Knapp-USGS)
W72-11651

WATER QUALITY PREDICTION WITHIN AN INTERBASIN TRANSFER SYSTEM,
Texas Water Devleopment Board, Austin. Systems Engineering Div.
W. A. White, L. F. Tischler, and T. A. Austin.
Water Resources Bulletin, Vol 8, No 3, p 483-494, June 1972. 6 fig, 7 ref.

Descriptors: *Water quality, *Inter-basin transfers, *Mathematical models, *Texas, *Planning, Computer programs, Simulation analysis, Systems analysis, *Model studies.
Identifiers: *Texas Water plan.

A methodology for predicting the spatial and temporal levels of conservative water quality constituents within a multibasin water resource system is presented. Dissolved solids, sulfates, and chlorides are the constituents used during this investigation; however, any other conservative ion or mineral can be incorporated into the simulation model. The methodology is tested on the proposed Texas Water System. The water quality model, QNET-I, utilizes monthly canal and river flows and reservoir storage levels calculated by the Texas Water Development Board's systems simulation model. Discharge-concentration relationships are developed for each source of water in the system, including significant waste-water discharges. Reservoirs in the system are assumed to be completely mixed with respect to conservative constituents. A mass balance analysis is performed for each node and each month during the simulation period. The output from the water quality simulation is a table of the concentrations of the conservative water quality constituents at each demand point in the system and in each reservoir and canal for every month the system is in operation. The desired quality of the water at the demand locations is used to determine the economic utility of transporting and mixing water from various sources. (Knapp-USGS)
W72-11652

COPPER, MANGANESE AND ZINC CONCENTRATIONS IN GULF OF MEXICO WATERS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 05A.
W72-11656

THE ROLE OF THE WATER FACTOR IN THE SPREAD OF INTESTINAL INFECTIONS,
I. P. Gal'Perin, and A. V. Vasil'Eva.
Zdravookhr Turkm. 9. 34-36. 1970.
Identifiers: Dysentery, Fever, Human diseases, *Intestinal infections, *Salmonella-Gaertneri, Typhoid, USSR, Public health, *Aerobic bacteria, *Pathogens.

Bacteriological analysis of 364 water samples from different sources, including 208 samples of tap water, 46 from purification equipment, 64 from irrigation ditches, 27 from rivers and wells, and 19 from swimming pools showed that all the sources contained pathogenic bacteria, but the most bacteria were found in the water from irrigation ditches and rivers. Salmonella gaertneri was found mostly in tap water (8 of 11 times), the pathogens of typhoid fever and dysentery in open waters (16 of 20 times). On 2 occasions tap water contained pathogenic serotypes of coliform bacilli. The presence of the pathogens of intestinal infections in water depended on the time of year. Typhoid microorganisms were found with equal frequency in spring and fall, dysentery more frequently in spring, Salmonella in spring and summer. These data show the potential danger of the occurrence of epidemic outbreaks of typhoid fever, paratyphoid, and dysentery from water in the area of Turkmenistan studied.--Copyright 1972, Biological Abstracts, Inc.
W72-11692

SOIL MOISTURE INFLUENCE ON TREATMENT AND EXTRACTION OF DDT FROM SOILS,
Agricultural Research Service, Beltsville, Md. Maryland Plant Science Research Div.
For primary bibliographic entry see Field 05A.
W72-11714

HETEROTROPHY BY PLANKTON IN THREE LAKES OF DIFFERENT PRODUCTIVITY,
Oak Ridge National Lab., Tenn. Ecological Sciences Div.
For primary bibliographic entry see Field 05C.
W72-11720

CHANGES IN ORGANOCHLORINE CONTAMINATION OF THE MARINE ENVIRONMENT OF EASTERN BRITAIN MONITORED BY SHAG EGGS,
Durham Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 05A.
W72-11721

IDENTIFICATION AND LOCATION OF ACTINOMYCETES IN THE SOUTHERN END OF LAKE MICHIGAN,
Chicago Dept. of Water and Sewers, Ill. Water Purification Div.
For primary bibliographic entry see Field 05A.
W72-11731

INSTRUMENTATION FOR MEASUREMENT OF WASTEWATER FLOW,
IIT Research Inst., Chicago, Ill.
T. K. Nedved, E. G. Fochtman, W. M. Langdon, and F. O. Sullivan.
Journal Water Pollution Control Federation, Vol. 44, No. 5, p 821-825, May 1972. 2 fig, 3 ref. DACW 23-68-C-0058.

Descriptors: *Instrumentation, *Suspended solids, *Drainage water, *Monitoring, *Discharge measurement, Hydrogen ion concentration, Dissolved oxygen, Chlorides, Sewage effluents, Physicochemical properties, Stream gages, Automation, Flow meters, Solid wastes, Dissolved solids, Water pollution sources, Analog computers, Equipment, Data collections, Water sampling, Turbidity, Specific conductivity.
Identifiers: Accuracy.

Variance in local stream conditions, inadequate sampling techniques, and unavailability of manpower have necessitated the development of more efficient methods of measuring suspended solids (SS) from industrial waste effluents. An automated water monitoring system has been designed to monitor the SS in proportion to water outflow and to require servicing only every 24 hours. The instrument is portable and self-contained and connected to an analog computer to perform required calculations and to initiate sampling. Outflow monitoring is measured with a pilot tube which provides information for water velocity calculations. Suspended solids (water turbidity) are measured by a photoelectric cell which detects quantities of reflected light. The instrument is very flexible and can be programmed to monitor any probe type measurement such as pH, dissolved oxygen, specific conductance, dissolved solids and chlorides. Furthermore, these values can be integrated with other variables tested. (Long-Battelle)
W72-11732

TOTAL OXYGEN DEMAND: A NEW TOOL FOR WASTEWATER ANALYSIS,
For primary bibliographic entry see Field 05A.
W72-11735

ACCUMULATION OF CS-137 BY AEDED AEGYPTI LARVAE AND THE EFFECT OF POTASSIUM CONCENTRATION,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
For primary bibliographic entry see Field 05C.
W72-11737

5C. Effects of Pollution

TOXICITY OF PETROCHEMICALS IN THE AQUATIC ENVIRONMENT,
Texas Univ., Austin. Dept. of Civil Engineering.
J. F. Malina, Jr.
Water and Sewage Works, Vol 111, No 10, October 1964, p 456-460. 1 fig, 2 tab, 20 ref.

Descriptors: *Pollutant identification, *Toxicity, *Bioassay, Fish, Aquatic environment, Organic pesticides, Hydrogen ion concentration, Temperature, Chlorinated hydrocarbon pesticides, Algae, Laboratory tests, Water pollution effects.
Identifiers: *Petrochemical compounds, Mean tolerance limit, Bluegills, Chlorella pyrenoidosa, Benzene compounds.

The organic chemical concentration carried in many water courses has been increasing as a result of the growing industrial, agricultural, and domestic applications of petrochemical products. The toxic effects of various petrochemicals on aquatic organisms were summarized. The results of bioassay tests indicating the acute toxicity of a specific compound on acclimatized test animals, namely fish, were arranged in tabular form. The toxicity data were reported as the 96 hour median tolerance limit. It was noted that in conducting a toxicity bioassay it is necessary to use the same species and size of test animal and that the water must be of uniform quality and the pH and temperature must be relatively constant. The chlorinated and phosphorus containing organic pesticides were more toxic to fish and invertebrates than any of the compounds tested. Alkyl aryl sulfonate, lactonitride, sodium butyl mecaptide, sodium cyanide and tetraethyl lead were toxic to bluegills in concentrations less than 10 mg/l. Also, the toxicity of various organic chemicals to a species of green algae Chlorella pyrenoidosa which had been evaluated in laboratory studies were reported. Compounds of the benzene series exhibited the highest toxicity with nitrobenzene being toxic at concentrations of 0.01 mg/l or less. (Galwardi-Texas)
W72-11105

PHOSPHATES AND PHOSPHATE SUBSTITUTES IN DETERGENTS (PART 2).
Committee on Government Operations (U.S. House).

Hearings--Comm. on Government Operations, U.S. House of Representatives, 92d Cong, 1st sess, October 29, 1971. 394 p, 3 fig, 6 illus, 1 photo, 38 tab, 5 append.

Descriptors: *Phosphates, *Water pollution sources, *Eutrophication, *Detergents, Water quality control, Domestic wastes, Runoff, Water softening, Environmental effects, Aquatic algae, Algal control, Algal poisoning, Aquatic environment, Aquatic fungi, Acquifer characteristics, Genetics, Dissolved oxygen.

Testimony is presented to the subcommittee on natural resources of the House Government Operations Committee concerning the effects of using phosphates in detergents. Testimony concerns consumer marketing attempts to eliminate phosphate detergents both voluntarily and by prohibiting their use through law. Testimony is also presented concerning the manner by which phosphate detergent discharges speed the normal eutrophication of a water body. The complete ban on phosphate detergent sale in Dade County, Florida, is discussed along with the unique ecological conditons present in that area. Efforts on the part of the Environmental Protection Agency to speed up the removal of phosphate discharges in water bodies are described. The dangerous health aspects of phosphate substitutes are also discussed. Optical brighteners used in detergents are examined and a scientific paper is appended. One problem with brighteners is that not enough is known about their effect on the environment. One scientist believes they may cause genetic mutations in some organisms. Appendices contain information on eutrophication, detergent content and analysis of their effects on the environment, and survey studies on pollution and eutrophication in the Nation's lakes. (Grant-Florida)
W72-11186

UREASE ACTIVITY OF CITRATE-POSITIVE E. COLI AS AN ECOLOGICAL SIGN,
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
G. G. Kalina.
Zh Mikrobiol Epidemiol Immunobiol. Vol 47, No 11, p 68-72. 1970. Illus. English summary.
Identifiers: Citrate, Ecology, *Pollutant identification, *E. coli, Feces, Sewage, Urease activity.

On the basis of studying 417 strains of citrate-positive Escherichia coli of various origin (from the intestine of healthy persons and dysentery patients, sewage, and river water of different degree of contamination) the urease activity of the citrate-positive E. coli was confirmed as an index of their fecal origin. Reduction in the relative amount of urease-active strains was not adequate for improvement of the sanitary-bacteriological characteristics of the water under study with the development of the autoclearance processes in them. This points to a more prolonged survival of such strains, which in the presence of satisfactory indices of the sanitary-indicative organisms pointed to a former fecal contamination. Finding of urease-positive E. coli can solve the question of the presence of fecal contamination.--Copyright 1972, Biological Abstracts, Inc.
W72-11213

SANITARY-BIOLOGICAL CONDITIONS AT PURIFICATION INSTALLATIONS,
Kharkov State Univ. (USSR).
T. V. Dogadina, L. I. Logvinenko, and M. V. Steblyuk.
Gidrobiol Zh. Vol 6, No 1, p 81-85. 1970. Illus.
Identifiers: *Algae, Astasia klebsii, Biology, Chilomonas paramecium, Chlamydomonas monadina, Cyclidiopsis acus, E. Coli, Mallomonopsis robusta, Mineralization, Nitzschia hungarica, Oscillatoria splendida, Oscillatoria tenuis, Oxygen, Palmellopsis gelatinosa, Phycomycetes, Phythiopsis cymosa, *Water purification, Synechoccus elongatus, USSR.

The purification of liquid effluents from the City of Pervomaisk was studied in Sept.-Dec., 1967 with particular attention given to the biological aspects of the process involved. The role of algae in lowering the Escherichia coli titer of the water was substantiated. With increasing proliferation of algae, as indicated by the number of species, the E. coli titer decreased and the index of biochemical utilization of O2 increased. Oscillatoria tenuis, O. splendida, Synechoccus elongatus, Nitzchia hungarica, Astasia klebsii, Cyclidiopsis acus, Chlamydomonas monadina, Chilomonas paramecium and Palmellopsis gelatinosa were present. Of the 139 species of algae found, 130 were in the biological purification pond. There were 6 species of golden algae. One of the golden algae species, Mallomonopsis robusta, was present in the pond in concentrations of 500,000 cells/l (1.28 mg/l), which is high for biological purification ponds. Of 22 representative saprobes detected in the pond, 20 were beta-mesosaprobes. Phycomycetes were present in the untreated effluent waters. With increasing degrees of purification of the water of bacteria, the number of species of phycomycetes increased. Phythiopsis cymosa was found for the first time in the Ukraine. The presence of 15 species of phycomycetes belonging to 7 genera was established. Due to the heterotrophic and saprophitic type of nutrition of phycomycetes, their participation in the biological mineralization of organic substances in the effluent waters may be assumed.--Copyright 1972, Biological Abstracts, Inc.
W72-11216

EFFECT OF HYDROGEN SULFIDE ON NORTHERN PIKE EGGS AND SAC FRY,
Minnesota Univ., St. Paul.
I. R. Adelman, and L. L. Smith, Jr.
Transactions of the American Fisheries Society, Vol. 99, No. 3, p 501-509, July 1970. 2 fig, 11 tab, 15 ref.

Descriptors: *Hydrogen sulfide, *Bioassay, *Dissolved oxygen, *Fish eggs, *Fish physiology, Pikes, Growth rates, Toxicity, Mortality, Hatching.
Identifiers: *Median tolerance limits, *Sublethal effects, Esox spp., Sac fry, Malformations.

Bioassays were conducted to test the effect of H2S at two concentrations of oxygen on northern pike (Esox lucius) eggs and sac fry. At an oxygen concentration of approximately 2 mg/l, mean median tolerance limits (TLm) for eggs were 0.411, 0.076, 0.038, 0.034, and 0.030 mg/l H2S for 24, 48, 72, 96 hr, and for the duration of the embryonic period, respectively. At an oxygen concentration of approximately 6 mg/l, mean TLm values were 0.181, 0.046, 0.041, 0.037, and 0.032 mg/l H2S for 24, 48, 72, 96 hr, and for the duration of the embryonic period, respectively. Mean TLm values for sac fry were 0.035, 0.016, 0.012, and 0.009 mg/l H2S at 2 mg/l oxygen, and 0.160, 0.047, 0.030, and 0.026 mg/l H2S at 6 mg/l oxygen for 24, 48, 72, and 96 hr, respectively. Eggs subjected to H2S resulted in increasing percentages of sac fry with anatomical malformations. Sac fry hatched from eggs held at the higher H2S concentrations were smaller than the controls. Sac fry subjected to H2S showed decreased growth rates at the higher concentrations. The maximum possible safe level of H2S for eggs is between 0.014 and 0.018 mg/l, and for sac fry between 0.004 and 0.006 mg/l for 96 hours exposure. (Svensson-Washington)
W72-11228

RATE OF ACCLIMATION OF JUVENILE CHANNEL CATFISH, ICTALURUS PUNCTATUS, TO HIGH TEMPERATURES,
Arkansas Univ., Fayetteville.
K. O. Allen, and K. Strawn.
Transactions of the American Fisheries Society, Vol 100, No 4, p 665-671, 1971. 8 fig, 14 ref.

Descriptors: *Acclimation, *Water temperature, *Channel catfish, *Bioassay, *Fish physiology, Aquatic environment, Fish, Heat resistance, Rates, Mortality, Regression analysis, Fisheries, Freshwater fish, Fish management.
Identifiers: Ictalurus spp.

Experiments were designed to determine the rate of temperature acclimation, measured in terms of change in heat resistance, when fish were kept at -- 26.0, 30.0, and 34.0C. Fish were tested at lethal temperatures of 38.5, 39.0, and 40.0C. Changes in average resistance time were used to determine progress toward acclimation. Fish changed from lower to higher temperatures were nearly reacclimated in 1-3 days. However, fish changed from higher to lower temperatures required 4-14 days to approach acclimation to the new temperature. In both changes, complete reacclimation required at least 12 days. Acclimation was accelerated at higher temperatures. A strong cyclic effect in the mean daily resistance time was noted. A maximum or minimum in resistance time occurred about every 2-4 days. These oscillations in resistance time were tested by utilizing multiple regression analysis. The equation derived were found to be quartic. No explanation was found for this rhythm. These findings indicate that tempering for a few hours would increase heat tolerance to some extent, but upwards of one day would be required to significantly increase heat tolerance. On the other hand, channel catfish could be held in cold water for 1-2 days with only a partial loss of heat tolerance. Fish exposed to fluctuating temperature should retain a relatively high heat tolerance. (Svensson-Washington)
W72-11229

THE ACUTE AND SUBACUTE TOXICITY OF CADMIUM (TOXICITATEA ACUTA SI AUBACUTA A CADMIULUI),
Institutul de Igiena si Sanatate Publica, Bucharest (Rumania).
A. Sporn, I. Dinu, L. Stoenescu, A. Cirstea, and L. G. Ghizelea.
Igiena, Vol 19, No 4, p 201-208, 1970. 2 tab, 24 ref.

Descriptors: *Cadmium, *Daphnia, *Toxicity, Bioassay, Water pollution effects, Lethal limit, Rodents, Freshwater, Animal physiology, Enzymes, Metals, Public health, Heavy metals.
Identifiers: *Cadmium chloride, Acute toxicity, Subacute toxicity, Sublethal toxicity, Lupinus spp., Rats, White rats, LD50, LD100, Mammaliam enzymes.

The action of cadmium chloride on growth of Lupinus albus, and on the mortality of Daphnia magna and the white rat was investigated. The minimum dose affecting the growth of L. albus was 5 mg/l, for D. magna the LD50 was 0.1 mg/l and the LD100 was 5 mg/l. For the white rat the LD50 per oral administration was 141 mg/kg of body weight. (Katz-Washington)
W72-11230

INVESTIGATIONS ON THE REMNANTS OF THE PHOSPHO-ORGANIC COMPOUND FOSCHLOR IN TISSUES OF FISHES SUBJECTED TO THE TREATMENT WITH THIS PREPARATION (BADANIA NAD POZOSTALOSCIA ZWIAZKU FOSFOROORGANICZNEGO FOSCHLOR W TKANKACH RYB PODDANYCH LECZENIU TYM PREPARATEM),
Wyzsza Szkola Rolnicza, Lublin (Poland). Zaklad Chorob Ryb.
M. Studnicka.
Polskie Archiwum Weterynaryjne, Vol 13, No 3, p 107-121, 1970. 3 tab, 22 ref.

Descriptors: *Organophosphorous pesticides, *Pesticide toxicity, *Fish physiology, *Physiological ecology, *Methodology, *Carp, *Persistence, Water temperature, Pesticide residues, Pesticide kinetics, Enzymes, Metabolism.
Identifiers: *Foschlor, *Acetylcholinesterase, *Residual effects, Muscle tissue, Brain tissue.

Studies were conducted on carp of various ages. Fish were subjected to 2% (20 min), 0.0002% - 4 days, and 0.0001% - 5 days of Foschlor at 3-4C and 10-16C. After treatment the acetylchloinesterase is reduced depending on the concentration and temperature of the test solution. Enzyme activity of all fish returned to normal after 14 days. Traces of Foschlor in the muscle tissue of fish subjected to 20% Foschlor could be detected up to the twelfth day. (Katz-Washington)
W72-11231

THE EFFECTS OF DDT, DIELDRIN AND 2,4-D ON AMPHIBIAN SPAWN AND TADPOLES,
Nature Conservancy, London (England). Monks Wood Experimental Station.
A. S. Cooke.
Environmental Pollution, Vol 3, p 51-68, 1972. 1 fig, 5 tab, 22 ref.

Descriptors: *Pesticide toxicity, *DDT, *Dieldrin, *2-4-D, *Frogs, *Toads, *Newts, Growth, Chlorinated hydrocarbon pesticides, Inhibition, Growth stages, Amphibians, Salamanders, Herbicides, DDE, Behavior, Pesticide residues, Animal behavior, Methodology.
Identifiers: *Growth inhibition, Frog eggs, Tadpoles, Absorption, Animal development, Developmental stages, Color changes.

Spawn of the common frog (Rana temporaria) or tadpoles of the common frog, common toad (Bufo bufo) or smooth newt (Triturus vulgaris) were maintained for 24 or 48 hr in amphibian saline to which pesticide had been added. DDT did not penetrate well-developed spawn and was only detected in hatching tadpoles after freshly laid spawn had been treated. These tadpoles became hyperactive after their external gills were lost. In the experiments in which frog and toad tadpoles were exposed to DDT, tadpoles were most susceptible either just before or just after developing hind limb buds and at these and later stages they became hyperactive when tissue concentrations reached 2-3 and 3-4 ppm, respectively. During tail resorption small frogs, unlike small toads, were susceptible to tissue residues of DDT that had been acquired during their larval development. At every stage of development, toads were more resistant to DDT than frogs, some toad tadpoles surviving despite tissue concentrations of greater than 300 ppm. After treatment with DDT, DDE was often detected in newt tadpoles and in frog and toad tadpoles with hind limbs. Dieldrin caused lower mortality among tadpoles than DDT and had less effect on behavior, although, like DDT, it produced distinct behavioral changes and morphological abnormalities. Only frog tadpoles were treated with 2,4-D. It had no visible effect and no tissue residues could be detected even after treatment in 50 mg/l for 48 hr. (Katz-Washington)
W72-11232

PERSISTENCE OF CHLORFENVINPHOS IN NATURAL WATERS,
Shell Research Ltd., Sittingbourne (England).
K. I. Beynon, M. J. Edwards, A. R. Thompson, and C. A. Edwards.
Pesticide Science, Vol 2, p 5-7, 1971. 1 fig, 2 tab, 19 ref.

Descriptors: *Organophosphorous pesticides, *Persistence, *Water pollution effects, *Benthos, Pesticide kinetics, Pesticide toxicity, Water pollution sources, Water pollution, Freshwater, Aquatic insects, Mayflies, Application methods, Crustacia, Pesticide residues.
Identifiers: Chironomid larvae, Aquatic arachnids, Arachnids, Chlorfenvinphos.

Chlorfenvinphos was sprayed at a dosage of 74 kg/ha (some 20-40 times the normal rate of application to agricultural land) on to the surface of a pond so that the water contained an average concentration of 6.1 mg/l. This decreased to 2.0 mg/l after 5 hr, and to 0.12 mg/l after one month. Residues were detected in the mud 5 hr after the treatment of the water and the concentration increased rapidly up to 5 hr after treatment, and reached a maximum value of 0.32 mg/kg at 115 hr after treatment. Chlorfenvinphos persisted in mud for at least 34 days, and while there was a decrease in the numbers of Chironomidae larvae, the numbers of other animals were too small to detect any significant changes. (Katz-Washington)
W72-11233

STUDIES ON THE CONTROL OF WHIRLING DISEASE (MYXOSOMA CEREBRALIS). I. THE EFFECTS OF CHEMICALS ON SPORES IN VITRO, AND OF CALCIUM OXIDE AS A DISINFECTANT IN SIMULATED PONDS,
Bureau of Sport Fisheries and Wildlife, Kearneysville, W. Va. Eastern Fish Diseases Lab.
G. L. Hoffman, Sr., and G. L. Hoffman, Jr.
Journal of Wildlife Diseases, Vol 8, p 49-53, 1972. 5 tab, 11 ref.

Descriptors: *Fish diseases, *Calcium compounds, *Potassium compounds, *Chlorine, *Ammonium compounds, *Sodium compounds, Copper sulfate, Rainbow trout, Chemcontrol, Treatment.
Identifiers: *Whirling disease, Calcium oxide, Potassium hydroxide, Ammonium chloride, Potassium permanganate, Sodium borate, Myxosoma, Alkyl dimethylbenzylammonium chloride, Fish disease treatment.

Based on presumptive evidence of death (extrusion of polar filaments and disintegration of sporoplasm) 1.0%, 0.5% and 0.25% calcium oxide or potassium hydroxide killed the spores of Myx-

osoma cerebralis in vitro. Chlorine at 400 mg/l destroyed 36% to 90% of the spores, but 13-37% of those in the controls perished. Calcium hydroxide, ammonium chloride, sodium borate, potassium permanganate, Roccal (alkyl dimethylbenzylammonium chloride), and copper sulfate allowed survival of 38-96% of the spores, usually not much less than the rate of survival of the controls. In simulated pond testing, quicklime at 380 grams or more per square meter (3360 lbs/acre) of pond bottom prevented whirling disease in rainbow trout (Salmo gairdneri). (Katz-Washington)
W72-11234

CHLORINATED HYDROCARBON RESIDUES IN MARINE ANIMALS OF SOUTHERN CALIFORNIA,
Westinghouse Ocean Research Lab. Annapolis, Md.
T. O. Munson.
Bulletin of Environmental Contamination and Toxicology, Vol 7, No 4, p 223-228, 1972. 2 tab, 6 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Pesticide residues, *DDT, *Polychlorinated biphenyls, *Outfall sewers, Pesticide kinetics, Path of pollutants, California, Herbivores, Food chains, Sewage effluents, Municipal wastes.
Identifiers: *Marine environment, Kellet's whelk, Sebastodes spp., Panalabrax spp., Sargo spp., Pinelo spp., Haliotis spp., Strongylcentrotus spp., Hinnites spp., Sea urchin, Scallops, ABALONE.

Fish, abalones and sea urchins were collected from a reef about one mile from the San Diego sewer outfall on October 1, 1970. Mollusks, lobsters, and echinoderms were collected off Orange County, California on October 7, 1970, and all were analyzed for DDT and PCB, and the DDT:PCB ratios were calculated. Highest body burdens of the chlorinated hydrocarbons were accumulated by organisms at the higher trophic levels. The lowest levels were found in the abalone, a strict herbivore, and the highest was found in fish. Kellet's whelk is suggested as a good indicator organism for these substances. (Katz-Washington)
W72-11235

RESEARCH ON THE EFFECTS OF LAUNDRY ENZYMES ON FISH AND OTHER AQUATIC ORGANISMS (UNTERSUCHUNGEN UEBER DIE WIRKUNG VON WASCHENMITTELENZYMEN AUF FISCHE UND ANDERE WASSERORGANISMEN),
Bundesforschungsanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei.
H. Mann.
Archiv fuer Fischereiwissenschaft, Vol 22, No 2, p 146-151, December 1971. 2 fig, 1 tab, 8 ref.

Descriptors: *Detergents, *Water pollution effects, *Toxicity, *Fish eggs, Water pollution sources, Laundering, Domestic wastes, Bioassay, Lethal limit, Pollutants, Enzymes, Freshwater fish, Aquatic life, Sewage treatment, Salinity, Rainbow trout, Tubificids, Eels.
Identifiers: *Laundry enzymes, *Detergent enzymes, *Fish larvae, Proteolytic enzymes, LD50, Guppies, Lebistes spp.

The effect of the proteolytic laundry enzyme Maxatase P on fish and other water organisms of fresh and brackish water was investigated. The most sensitive organisms are fish eggs and larvae. The 24-hr LD50 for eggs of aquarium fish (Rivulus cylindraceus) and trout fry amounts to approximately 1-5 mg/l of Mexatase P. Fully grown fish can endure relatively higher concentrations. The detrimental effect of Maxatase P examined increases with increasing salinity. Gammarids of brackish water are, according to the investigation, least affected. The heating of the washing solution up to over 50C during the washing process destroys most of the enzyme. Only a comparatively small quantity gets into sewage. The remainder is decomposed in purification plants. Under normal conditions proteolytic enzymes of detergents will have no detrimental effect. (LeGore-Washington)
W72-11236

THE RESPONSE OF BLUEGILL SUNFISH (LEPOMIS MACROCHIRUS RAFINESQUE) TO SEISMIC SHOCK,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
R. E. Sparks, and J. Cairns, Jr.
Hydrobiologia, Vol 39, No 2, p 273-276, 1972. 2 fig, FWQA 18050 EDQ.

Descriptors: *Stress, Sunfishes, Lepomis species, Earthquakes, Fish physiology, Physiological ecology, Fish behavior.
Identifiers: *Fright response, *Response, *Alarm, Polygraph records, Breathing, Physiological response.

Living bluegills exhibited a fright response to an earthquake on November 19, 1969. Abnormal breathing and heart responses were noted in laboratory fish after an earthquake. (Katz-Washington)
W72-11237

DISSOLVED NITROGEN CONCENTRATIONS IN THE COLUMBIA AND SNAKE RIVERS IN 1970 AND THEIR EFFECT ON CHINOOK SALMON AND STEELHEAD TROUT,
National Marine Fisheries Service, Seattle, Wash.
W. J. Ebel.
National Oceanic and Atmospheric Administration, Technical Report NMFS SSRF-646, August 1971. 7 p, 2 fig, 6 tab, 4 ref.

Descriptors: *Nitrogen, *Columbia River, *Chinook salmon, *Supersaturation, *Dams, *Fishkill, *Fish physiology, Fisheries, Trout, Bonneville Dam, Fish barriers, Fish migration, Fish populations, Fish diseases.
Identifiers: *Dissolved nitrogen, *Snake River, *Gas bubble disease, *Steelhead trout, Salmo spp., Oncorhynchus spp.

Concentrations of dissolved nitrogen gas varied widely (81.6-146.4% saturation) in 1970 but were generally lower in the Columbia River than in 1968-69. Concentrations were high, however, in some areas of the Snake River in the spring and early summer, mainly because of spilling of water at Little Goose Dam. Symptoms of gas bubble disease were widespread in Snake River juvenile and adult chinook salmon (Oncorhynchus tshawytscha) and steelhead trout (Salmo gairdneri). There were substantial losses of fish, particularly juveniles, during periods of high concentrations of dissolved nitrogen gas. (Svensson-Washington)
W72-11239

DDT: DISRUPTED OSMOREGULATORY EVENTS IN THE INTESTINE OF THE EEL ANGUILLA ROSTRATA ADAPTED TO SEAWATER,
Mount Desert Island Biological Lab., Salisbury Cove, Me.
R. H. Janicki, and W. B. Kinter.
Science, Vol 173, p 1146-1148, September 1971. 2 fig, 29 ref.

Descriptors: *DDT, *Osmosis, *Seawater, *Eels, *Pesticide toxicity, *Animal physiology, *Fish physiology, *Water pollution effects, Absorption, Teleosts, Pesticides, Insecticides, Chlorinated hydrocarbon pesticides, Enzymes.
Identifiers: *Osmoregulation, Intest inal absorption, Anguilla spp., Adenosine triphosphatase.

The drinking of seawater and absorption of water along with sodium across the intestinal epithelium are well known osmoregulatory events in marine teleosts. The insecticide DDT impairs fluid absorption in intestinal sacs from eels adapted to seawater. Furthermore, this functional impairment has an enzymatic basis; DDT also inhibits the Na (+) and K (+) activated, MG (2+) dependent adenosine triphosphatase in homogenates of the intestinal mucosa. Thus, the extreme sensitivity of teleosts to organochlorine pollutants may involve the disruption of osmoregulatory transport mechanisms. (Svensson-Washington)
W72-11240

STUDIES ON THE POLLUTION OF FISH MEAT BY MINERAL OILS--II. INJURY AND POLLUTION BROUGHT FORTH ON FISH BY OIL DISPERSERS,
Kagoshima Prefecture Fisheries Experimental Station (Japan).
O. Deshimaru.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 37, No 4, p 302-306, April 1971. 8 fig, 2 tab, 3 ref.

Descriptors: *Oil pollution, *Bioassay, *Water pollution effects, *Marine fish, *Toxicity, *Carp, Oily water, Gas chromatography, Analytical techniques, Taste, Odor, Water quality, Mortality.
Identifiers: *Seafood, *Crude oil, *Mineral oil, *Oil dispersers, Cyprinus spp.

The practice of using oil dispersers may be harmful to fish, and the pollution of fish meat caused by the oil and dispersers have also become of great concern. From this viewpoint, four kinds of commercial dispersers were tested with carp, Cyprinus carpio. Two of them were highly toxic for the fish; at a level lower than 20 mg/l half of the fish died after 48 hr, the other two were relatively nontoxic and 600 mg/l showed the same effect as in the above condition. Dispersers containing mineral oils in their ingredients showed an oily polluted smell on the fish meat. Analyzing the polluted meat with gas chromatographic techniques, the chromatogram interpreted well the causal dispersers which were olfactorily not easily distinguishable from one another. (Svensson-Washington)
W72-11241

STUDIES ON THE POLLUTION OF FISH MEAT BY MINERAL OILS--I. DEPOSITION OF CRUDE OIL IN FISH MEAT AND ITS DETECTION,
Kagoshima Prefecture Fisheries Experimental Station (Japan).
O. Deshimaru.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 37, No 4, p 297-301, 1971. 5 fig, 2 tab, 13 ref.

Descriptors: *Oil pollution, *Bioassay, *Oily water, *Water pollution effects, *Marine fish, Fish, Fish physiology, Absorption, Gas chromatography, Analytical techniques, Taste, Odor, Water quality.
Identifiers: *Crude oil, *Mineral oil, Seriola spp., Seafood.

Yellow tail, Seriola quinqueradiata, were reared in seawater experimentally polluted with crude oil and its deposition in the meat was studied. Testing a piece of meat in the mouth, an obvious or slight oily smell was perceived in fish reared in seawater with crude oil in the range of 50 mg/l for 5 days or 10 mg/l for 13 days. By feeding fish with a diet containing crude oil of about 1%, a slight smell was perceived in the meat after 8 days' culture. Collecting the vapor from the sample meat by the head space method, the resulting gas chromatogram was almost identical to the crude oil assayed. (Svensson-Washington)
W72-11242

VENTILATION, THE HEART BEAT AND OXYGEN UPTAKE BY MYTILUS EDULIS L. IN DECLINING OXYGEN TENSION,
Leicester Univ. (England).
B. L. Bayne.

Comparative Biochemistry and Physiology, Vol 40A, p 1065-1085, 1971. 12 fig, 1 tab, 22 ref.

Descriptors: *Oxygen requirements, *Dissolved oxygen, *Animal physiology, *Respiration, *Mollusks.
Identifiers: *Oxygen tension, *Blood oxygen capacity, Mytilus spp., Oxygen consumption, Ventilation rate, Heartbeat, Oxygen debt.

Whereas the direct measurement of heart output in Mytilus edulis has not proved possible to date, estimates of heart rate and amplitude, together with simultaneous measurement of ventilation and respiration rates provide some understanding of gas exchange in this species. The animals that were used in the experiments recorded here were able to regulate oxygen uptake in declining oxygen tension for up to 30 days in the laboratory, after which they became metabolic conformers to oxygen. This provided a means to study regulation of oxygen consumption in this species, by comparing individuals capable of regulation with others showing conformity to oxygen tensions. Ventilation rate and the frequency and amplitude of heart beat increased at slightly reduced oxygen tension. At low pO2 ventilation rate and heart frequency declined, with increased amplitude of heart beat. The (ventilation): (relative perfusion) ratio decreased with declining pO2 in regulators, but remained constant in conformers. It is suggested that regulation of oxygen consumption at reduced oxygen tension is based on control of the (ventilation) : (perfusion) ratio. (Svensson-Washington)
W72-11243

OXYGEN CONSUMPTION BY THREE SPECIES OF LAMELLIBRANCH MOLLUSC IN DECLINING AMBIENT OXYGEN TENSION,
Leicester Univ. (England).
B. L. Bayne.
Comparative Biochemistry and Physiology, Vol 40A, p 955-970, 1971. 15 fig, 1 tab, 14 ref. GR/3/516.

Descriptors: *Oxygen requirements, *Dissolved oxygen, *Mollusks, *Animal physiology, *Respiration, Ecology, Bioassay, Metabolism.
Identifiers: *Oxygen tension, *Oxygen consumption, *Lamellibranchs, Arctica spp., Laevicardium spp., Mytilus spp.

The results of experiments to determine the relationship between size, oxygen tension and oxygen consumption in three lamellibranch species are described. Oxygen consumption by Arctica islandica was dependent on oxygen tension. Oxygen uptake by Laevicardium crassum and Mytilus edulis was independent of oxygen tension above a certain critical tension. An index is derived to indicate the degree of dependence of oxygen consumption on oxygen tension. In L. crassum and M. edulis larger individuals were less dependent on oxygen tension than smaller individuals. In M. edulis dependence of oxygen consumption to oxygen tension increased during periods of laboratory stress. (Svensson-Washington)
W72-11244

CHEMICAL STUDIES OF COLD DEATH IN THE GULF KILLIFISH, FUNDULUS GRANDIS,
Cincinnati Univ., Ohio.
B. L. Umminger.
Comparative Biochemistry and Physiology, Vol 39A, p 625-632, 1971. 3 tab, 17 ref. 6B-26321.

Descriptors: *Cold resistance, *Fish physiology, *Bioassay, Mortality.
Identifiers: *Osmoregulation, *Ionoregulation, *Serum composition, *Gulf killifish, *Cold death, *Low temperature acclimation, Serum osmolality, Serum sodium, Serum chloride, Serum potassium, Serum glucose, Fundulus spp.

Serum chemistry was examined in saltwater-adapted Gulf killifish, Fundulus grandis, acclimated to 11, 4 and -1.5C. Exposure of fish to-1.5C caused cold death or coma in most fish within 7 days, presumably due to osmotic imbalance. Exposure to -1.5C was accompanied by a striking increase in serum osmolality and serum glucose, but by a decrease in serum sodium and chloride. Serum potassium was unchanged. The increase in serum osmalality in the cold was attributed to an accumulation of unknown organic substances. The reduction in serum electrolyte levels in the cold was thought to be an unsuccessful attempt to compensate for the elevation in serum osmolality caused by the buildup in serum organic constituents. (Svensson-Washington)
W72-11245

INFLUENCE OF PESTICIDES ON MARINE ECOSYSTEMS,
Fish and Wildlife Service Gulf Breeze, Fla.
P. A. Butler.
Proceedings of the Royal Society of London, Series B, Vol 177, p 321-329, 1971. 2 tab, 6 ref.

Descriptors: *Bioassay, *Pesticides, *Pesticide toxicity, *Pesticide residues, *Water pollution effects, *Water pollution sources, *Mollusks, *Pesticide kinetics, Mortality, Estuaries, DDT, Water pollution, Herbicides, Insecticides, Organophosphorous pesticides, Chlorinated hydrocarbon pesticides, Polychlorinated biphenyls, Public health, Dieldrin, 2-4-D, Aldrin, Endrin.
Identifiers: *Estuarine animals, *Marine ecosystems, *Sublethal effects, Mirex, Malathion, Toxaphene, DMPA, Dyrene, Naled.

A bioassay program undertaken in 1958 has evaluated the toxicity of about 240 pesticides to estuarine fauna. Studies indicate that chronic levels of sublethal amounts of pesticides may have more damaging effects than transitory changes due to acutely toxic levels of pollution. The first five years of a program monitoring the incidence of synthetic pesticide residues in populations of North American shellfish has been completed. The results demonstrate the ubiquity of DDT and its metabolites. Levels of contamination, however, are not high enough to indicate a human health problem. The runoff of surface waters from agricultural districts is indicated as the chief source of this type of pollution; municipal and industrial wastes, and the control of noxious insects are regionally important sources. Observations of laboratory populations experimentally contaminated with DDT indicate, by extrapolation, that pesticide pollution is causing significant changes in mortality, growth rates, or resistance to disease in some marine populations. (Svensson-Washington)
W72-11246

BOD SUB 5 AND TOXICITY ASSOCIATED WITH LOG LEACHATES,
Oregon State Univ., Corvallis.
F. D. Schaumburg, and S. Atkinson.
Report presented at the conference of the Western Division of the American Fisheries Society, July 13-16, (1970), Victoria, British Columbia, Canada. 7 p, 10 ref. WP 01320.

Descriptors: *Biochemical oxygen demand, *Chemical oxygen demand, *Leachate, *Lumbering, *Bioassay, *Fisheries, Toxicity, Mortality, Chinook salmon, Rainbow trout, Pacific Northwest U.S., Douglas fir trees, Hemlock trees, Ponderosa pine trees, Water pollution sources, Water pollution effects.
Identifiers: *Log leachates, Median tolerance limit.

A description of a quantitative evaluation of the 5-day biochemical oxygen demand (BOD sub 5) and acute toxicity associated with leachates from floating logs is presented. The leachates contain wood sugar and other biodegradable substances which exert a considerable BOD sub 5. Leachate from ponderosa pine, hemlock, and older Douglas fir logs, with and without bark, is not acutely toxic to salmon and trout fry in 96 hr exposure. Leachate from younger Douglas fir logs did result in mortality in some test fish. (Svensson-Washington)
W72-11248

EFFECT OF TEMPERATURE ACCLIMATION ON THE FATTY ACID COMPOSITION OF GOLDFISH INTESTINAL LIPIDS,
Agricultural Research Council, Babraham (England). Inst. of Animal Physiology.
P. Kemp, and M. W. Smith.
Biochemistry Journal, Vol 117, p 9-15, 1970. 1 fig, 5 tab, 18 ref.

Descriptors: *Acclimatization, *Water temperature, *Fish physiology, *Lipids, Aquatic environment, Adaptation, Chromatography.
Identifiers: *Goldfish, *Fatty acids, Sublethal effects, Phospholipids, Intestinal mucosa, Saturated fatty acids, Unsaturated fatty acids.

The fatty acid composition of both plant and animal tissues can be modified by a change in environmental temperature, the proportion of unsaturated to saturated fatty acids increasing when the environmental temperature falls. The fatty acid composition of whole goldfish, whole intestinal mucosa, intestinal mucosal membranes and individual phospholipids extracted from mucosal membranes were measured, fish adapted to different temperatures being used. Alterations of the adaptation temperature did not noticeably affect the fatty acid composition of the whole fish lipids, but there were marked changes in the fatty acids of lipids extracted from homogenates of goldfish intestinal mucosa. These changes were more pronounced in a membrane fraction prepared from these homogenates. Raising the adaptation temperature by 20C halved the percentage of C sub 20:1, C sub 20:4 and C sub 22:6 fatty acids and nearly doubled the percentage of C sub 18:0 and C sub 20:3 fatty acids recovered. Choline phosphoglycerides constituted about 1/2 and ethanolamine phosphoglycerides about 1/4 of the total membrane phospholipids. The fatty acids of choline and ethanolamine phosphoglycerides were more susceptible to temperature-dependent changes than were the phosphoglycerides of inositol or serine. The increase in C sub 18:0 fatty acid that occurred in membranes of warm-adapted fish was greatest for ethanolamine phosphoglycerides, but increases also occurred in other phospholipid fractions and in membrane neutral lipids. (Svensson-Washington)
W72-11249

ACTION OF DDT ON EVOKED AND SPONTANEOUS ACTIVITY FROM THE RAINBOW TROUT LATERAL LINE NERVE,
Michigan State Univ., East Lansing.
T. G. Bahr, and R. C. Ball.
Comparative Biochemistry and Physiology, Vol 38A, p 279-284, 1971. 2 fig, 8 ref. FWPCA FI-WP-26,004-03.

Descriptors: *Pesticide toxicity, *Insecticides, *DDT, *Chlorinated hydrocarbon pesticides, *Rainbow trout, *Fish physiology, *Bioassay, Pesticides, Aquatic environment.
Identifiers: *Neural activity, Lateral line, Central nervous system, Salmo spp.

Spontaneous and evoked neural activity was recorded from multifiber lateral line nerve preparations of rainbow trout, Salmo gairdneri. DDT was administered to fish in water and by intravenous injection. DDT-treated fish demonstrated classical poisoning symptoms in the absence of abnormal lateral line nerve discharge. Results indicate that the frequency of spontaneous activity from the lateral line nerve does not provide a sensitive index for analyzing the neurotoxic action of DDT, and afferent activity from this nerve appears to play a minor role in acute poisoning symptoms. (Svensson-Washington)
W72-11250

EFFECTS OF THERMAL EFFLUENT UPON MARINE FISHES NEAR THE CRYSTAL RIVER STEAM ELECTRIC STATION,
Florida Dept. of Natural Resources, St. Petersburg.
C. B. Grimes, and J. A. Mountain.
Professional Papers Series, No 17, October 1971. 64 p, 14 fig, 8 tab, 43 ref, 6 append.

Descriptors: *Gulf of Mexico, *Electric powerplants, *Thermal pollution, *Water pollution effects, *Aquatic environment, *Marine fish, *Fish populations, Florida, Electric generators, Water temperature, Hydrologic data, Cooling water, Thermal stratification, Salinity.
Identifiers: *Species diversity, *Thermal plume, Crystal River (Florida), Orthopristis spp., Bairdiella spp., Leiostomus spp., Lagodon spp.

A field investigation begun in 1969 to determine ecological effects of hot water discharge of a steam electric generating plant in Crystal River, Florida was continued. In 1970, a second generating unit was discharging heated water. Effects of the effluent upon the Gulf of Mexico fishes in the vicinity of the plant were studied. Bi-monthly trawl samples indicated that influence of the thermal plume had extended into previously unaffected intermediate depth areas. Species abundance at intermediate trawl stations was higher in 1970 than in 1969, except during August. It was higher at nonaffected than affected station except in December. A species diversity determination indicated higher shallow station diversity in winter at affected stations, but higher in summer at unaffected stations. Suppressed summer diversity may be due to thermal stress on the community. Greatest diversity both winter and summer occurred at affected intermediate depth stations. A pattern of increasing diversity from north to south in trawl stations transects (shallow and intermediate depth) was also observed. The pattern was apparently related to salinity, which also increased from north to south, and/or to habitat destruction from dredging operations, which was greatest at northern stations. Frequency of occurrence of the four most abundant species (Orthopristis chrysoptera, Bairdiella chrysura, Leiostomus xanthurus, and Lagodon rhomboides) in affected vs. unaffected areas was statistically analyzed and did not differ significantly. Spawning, movement, age, and growth of these species from affected and unaffected stations were also considered. (Svensson-Washington)
W72-11251

BENTHIC MARINE ALGAE FROM WATERS ADJACENT TO THE CRYSTAL RIVER ELECTRIC POWER PLANT (1969 AND 1970),
Florida Dept. of Natural Resources, St. Petersburg.
K. A. Steidinger, and J. F. Van Breedveld.
Professional Papers Series, No 16, June 1971. 46 p, 1 fig, 22 tab, 14 ref.

Descriptors: *Benthic flora, *Marine algae, *Gulf of Mexico, *Electric powerplants, *Thermal pollution, *Aquatic environment, Florida, Electric generators, Water temperature, Rhodophyta, Phaeophyta, Chlorophyta, Cooling water, Hydrologic data.
Identifiers: *Species diversity, Crystal river.

One hundred six taxa of marine algae were identified from Gulf of Mexico waters adjacent to the Florida Power Corporation electrical generating plant at Crystal River, Florida in 1969 and 1970. Of the 106 taxa, 19 belong to Chlorophyta, 24 to Phaeophyta, and 63 to Rhodophyta. Reductions in species diversity, as well as incidence of occurrence, were noted in 1970. Causes of these reductions are not known. However, increased temperature does not appear to be a factor since deeper water stations, which were also affected, are not exposed to the thermal plume. The study area is semi-tropical or warm-temperate, with a primarily seasonal flora. Winter appeared to be the season of lowest species diversity. Several new distribution records are reported. (Svensson-Washington)
W72-11252

STUDIES ON ACCUMULATION OF HEAVY METALS IN AQUATIC ORGANISMS--I. ON THE COPPER CONTENTS IN OYSTERS,
Miyazaki Univ. (Japan).
K. Ikuta.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 33, No 4, p 405-409, 1967. 2 fig, 1 tab, 11 ref.

Descriptors: *Copper, *Oysters, *Heavy metals, *Water pollution, *Industrial wastes, Absorption, Water pollution sources, Water pollution effects, Chemical wastes, Aquatic environment, Public health.
Identifiers: *Trace metals, *Green oysters, Nobeoka Bay (Japan), Biological magnification, Seafood Japan.

The copper content is discussed of the meat of oysters which were collected in Nobeoka Bay and its neighboring water, Miyazaki Prefecture, January to March, 1965. The experiment was carried out in order to prove the difference between the copper contents in oysters caught on the southern coast of Nobeoka Bay (s-group) and those in the waters adjacent to Nobeoka Bay (n-group). According to the mean value of the copper contents in oysters caught at each sampling station, the s-group ranged from 320.2 to 686.8 mg Cu/kg freshbody weight, and the n-group ranged from 40.0 to 99.4 mg. Between the copper content of s-group and n-group the evident difference is seen at the significance of 0.1%. It appears that one of the environmental factors making copper concentrated in the oysters of s-group is due to the copper being discharged into seawater by a Benberg factory and an exhausted mine gutter. (Svensson-Washington)
W72-11256

STUDIES ON ACCUMULATION OF HEAVY METALS IN AQUATIC ORGANISMS--II. ON ACCUMULATION OF COPPER AND ZINC IN OYSTERS,
Miyazaki Univ. (Japan).
K. Ikuta.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 34, No 2, p 112-116, 1968. 4 fig, 2 tab, 10 ref.

Descriptors: *Copper, *Zinc, *Oysters, *Heavy metals, Water pollution sources, Water pollution effects, Water pollution, Chemical wastes, Aquatic environment, Public health.
Identifiers: *Trace metals, *Green oysters, Biological magnification, Seafood, Accumulation, Nobeoka Bay (Japan), Japan.

Normal oysters at Urashiro Bay were transplanted to Akamizu Inlet where the variation of copper and zinc accumulation in the meats of oysters was examined. Normal accumulation refers to the copper and zinc accumulation in oysters at Urashiro Bay, the control field, and the abnormal accumulation refers to the copper and zinc accumulation in oysters at Akamizu Inlet, the test field. The quantity of absolute abnormal accumulation is calculated by subtracting the normal accumulation of copper and zinc at Urashiro Bay from the abnormal accumulation. The quantity of copper in abnormal accumulation increases in the exponential function type, $\log Y = 1.4399 + 0.0069X$, and that of zinc indicates a sigmoid type. It appears that the normal accumulation has influence upon the variation of quantity of absolute abnormal accumulation of copper and zinc. (Svensson-Washington)
W72-11257

STUDIES ON ACCUMULATION OF HEAVY METALS IN AQUATIC ORGANISMS--III. ON ACCUMULATION OF COPPER AND ZINC IN THE PARTS OF OYSTERS,
Miyazaki Univ. (Japan).
K. Ikuta.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 34, No 2, p 117-122, 1968. 10 fig, 2 ref.

Descriptors: *Copper, *Zinc, *Heavy metals, *Oysters, Water pollution, Water pollution effects, Chemical wastes, Aquatic environment, Public health, Animal physiology, Physiological ecology, Absorption.
Identifiers: *Trace metals, *Green oysters, Biological magnification, Seafood, Accumulation, Nobeoka Bay (Japan), Japan.

The variation is reported of accumulated copper and zinc in five parts of oysters: mantles, gills, labial palps, adductor muscle, and the remainder of the animal. Normal, abnormal, absolute abnormal and relative accumulation in the parts of oysters transplanted to copper and zinc polluted water in Akamizu Inlet and normal oysters at Urashiro Bay are discussed. (Svensson-Washington)
W72-11258

LIMITATIONS AND EFFECTS OF WASTE DISPOSAL ON AN OCEAN SHELF.
Florida Ocean Sciences Inst., Deerfield Beach.
For primary bibliographic entry see Field 05B.
W72-11275

THE EFFECT OF ZINC AND COPPER ON THE OSMOLALITY OF BLOOD SERUM OF THE CHANNEL CATFISH, ICTALURUS PUNCTATUS RAFINESQUE, AND GOLDEN SHINER, NOTEMIGONUS CRYSOLEUCAS MITCHELL,
South Illinois Univ., Carbondale. Dept. of Zoology.
S. D. Lewis, and W. M. Lewis.
Trans Am Fish Soc. Vol 100 No 4 p 639-643. 1971. Illus.
Identifiers: Blood, Catfishes, *Heavy metals, Copper, *Fish, Ictalurus punctatus, Notemigonus crysoleucas, Osmolality, Serum, Golden shiner, Toxicity, Zinc, *Water pollution effects.

A new, and possibly primary, effect of heavy metals on fishes is described. It is demonstrated that heavy metals so affect fishes as to cause a drop in the salt concentration in the blood serum. This change in the ionic content of the blood can cause the fish to become weakened, and pronounced change can be fatal. Salt changes in the blood were monitored by osmometry. The effects of both Zn and Cu were evaluated.--Copyright 1972, Biological Abstracts, Inc.
W72-11319

RATE OF ACCLIMATION OF JUVENILE CHANNEL CATFISH, ICTALURUS PUNCTATUS, TO HIGH TEMPERATURES,
Bureau of Sport Fisheries and Wildlife, Stuttgart, Ark. Fish Farming Experimental Station.
K. O. Allen.
Trans Am Fish Soc. Vol 100 No 4 p 665-671. 1971. Illus.
Identifiers: Acclimation, *Catfishes, Ictalurus punctatus, Rates, *Temperature.

Experiments were designed to determine the rate of temperature acclimation, measured in terms of change in heat resistance, when fish were changed between 3 temperatures-26.0, 30.0, and 34.0 C. Approximately 2300 juvenile I. punctatus, were tested. Fish acclimated to each of the 3 temperatures were exposed to each of the other 2 temperatures. The length of time required to acclimate to the new temperature was then monitored by testing samples of fish at 0, 1, 3, 9 hr, and then daily after the temperature change was made. Fish were tested at 3 lethal temperatures of 38.5, 39.0, and 40.0 C. Changes in average resistance time were used to determine progress toward acclimation. Fish changed from lower to higher temperatures were nearly reacclimated in 1 to 3 days. However, fish changed from higher to lower temperatures required from 4 to 14 days to approach acclimation

to the new temperature. In both changes, complete reacclimation required at least 12 days. Acclimation was accelerated at higher temperatures. A strong cyclic effect in the mean daily resistance time was noted. A maximum or minimum in resistance time occurred about every 2 to 4 days. These oscillations in resistance time were tested by utilizing multiple regression analysis. The equations derived were found to be quartic ($P<.01$). No explanation was found for this rhythm. These findings indicate that tempering for a few hr would increase heat tolerance to some extent, but upwards of 1 day would be required to significantly increase heat tolerance. Channel catfish could be held in cold water for 1 or 2 days with only a partial loss of heat tolerance. Fish exposed to fluctuating temperature should retain a relatively high heat tolerance.--Copyright 1972, Biological Abstracts, Inc.
W72-11320

TOXICITY OF ALUMINUM HYDROXIDE COMPLEXES IN NEUTRAL AND BASIC MEDIA TO RAINBOW TROUT,
Michigan State Univ; East Lansing. Inst. of Water Resources.
R. A. Freeman, and W. H. Everhart.
Trans Am Fish Soc. Vol 100 No 4 p 644-658. 1971. Illus.
Identifiers: *Aluminum, Mortality, *Rainbow trout, *Toxicity, Hydrogen ion concentration, Water pollution effects.

Toxic effects of aqueous Al complexes in neutral and basic media to rainbow trout fingerlings were investigated under constantly flowing, controlled conditions of concentration, pH, and temperature. Toxicities of various concentrations were highly pH dependent. Dissolved concentrations over 1.5 ppm Al caused drastic physiological and behavioral aberrations as well as acute mortality. While toxic effects of suspended aluminum are more noticeable at lower concentrations, they are not as concentration dependent as those of dissolved forms. The safe concentration of either dissolved or suspended Al is well below 0.5 ppm. Mortalities among test animals ceased almost immediately after Al exposures were concluded. Recovery times for fish exposed to the various tests were proportional to the severity of the test conditions and to the length of exposure. Normal growth resumed almost immediately in fish from the less severe tests, and after a period of a few weeks in fish from the more severe tests. After up to 4 mo. recovery the average weight of fish surviving both chronically and acutely toxic Al concentrations is markedly below the control average.--Copyright 1972, Biological Abstracts, Inc.
W72-11321

COMPARATIVE ASPECTS OF THE BIOLOGY OF PIKE, ESOX LUCIUS L., IN TWO SCOTTISH LOCHS,
Glasgow Univ. (Scotland). Dept. of Zoology.
M. Shafi, and P. S. Maitland.
Proc R Soc Edinb Sect Biol. Vol 71, No 4, p 41-60. 1971. Illus.
Identifiers: Age, *Biology, Coregonus clupeoides, Esox lucius, Growth stages, Invertebrates, Lochs, Perca fluviatilis, *Pike, Salmo trutta, Scotland.

Several aspects of the biology of E. lucius in 2 contrasting waters in Scotland were studied: one of these, Loch Lomond, is large and mesotrophic while the other, the Dubh Lochan, is small and dystrophic. Altogether, over 300 fish were examined during the study. Formulae for the length-weight relationship of pike in both waters were established. Age and growth was studied using opercular bones; the pattern of growth was the same throughout life, females growing faster than males in both lochs. The growth was found to follow Von Bertalanffy's formula closely and growth formulae for fish in both waters were established. The fecundity of pike in Loch Lomond indicated an average of 29,300 eggs/kg of body weight although the relationship was not a close one. The food of pike in the Dubh Lochan consisted mainly of perch (Perca fluviatilis L.) and invertebrates, and in Loch Lomond of powan (Coregonus clupeoides Lacepede) and trout (Salmo trutta L.). Tagging experiments in the Dubh Lochan indicated,that the size of the population there was small-estimated at 89 adult fish in 1967 and 51 in 1968.--Copyright 1972, Biological Abstracts, Inc.
W72-11331

DISEASES OF FEEDLOT CATTLE,
R. Jensen, and D. R. Mackey.
Lea and Febiger: Philadelphia, Pa. 1971. 2nd Edition. 377 p.
Identifiers: *Animal diseases, Cattle, Feed lots, Farm wastes, Water pollution sources.

Emphasizing the diseases of feedlot cattle, this book brings together current literature pertinent to an expanding branch of veterinary medicine. Each disease is considered under the headings of definition, occurrence, etiology and pathogenesis, clinical signs, postmorten lesions, prevention and treatment. Autopsy findings are presented exactly as practitioners and students should have them to make accurate diagnoses. Carefully selected postmortem and antemortem photographs augment the test. In addition to individual treatments, mass treatments for numerous cattle in a specific lot are described. Many of the newer diseases are discussed, with advice on vaccinations and preventive methods found helpful in their control. Full consideration is given to the causes, clinical signs, diagnosis and treatment of viral bovine rhinotracheitis and other respiratory diseases which cause such serious losses to the cattle fattening industry. All chapters are revised for this edition, with up-to-date information added on treatments, including the use of thiamine hydrochloride for polioencephalomalacia. New preventive measures are discussed, such as the vaccine for the protection against shipping fever. The economic importance of each disease is given and the problems of feedlot pollution of water, soil and air are considered fully. New chapters cover such important topics as preconditioning, adapting cattle to the change in diet from roughage to concentrate, bluetongue, necrotic posthitis and high mountain disease. A subject index is included.--Copyright 1972, Biological Abstracts, Inc.
W72-11348

THE RECOVERY OF STREAM MACROBENTHIC COMMUNITIES FROM THE EFFECTS OF ACID MINE DRAINAGE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
E. E. Herricks, and J. Cairns, Jr.
In: Proceedings, Fourth Symposium on Coal Mine Drainage Research, Mellon Institute, April, 1972, p 370-398. 13 fig, 6 tab. OWRR B-034-VA (3).

Descriptors: *Mine drainage, *Acid streams, Aquatic insects, *Aquatic animals, Biological communities, Aquatic drift, *Pennsylvania.
Identifiers: Recovery, *Indian Creek (Penn).

Indian Creek, Fayette County, Pennsylvania was studied to note the effects of acid mine drainage on aquatic macrobenthic communities. Indian Creek receives one major acid discharge and several minor seepage discharges in its upstream region. Reference stations showed a high diversity, d 3.2 and above. Diversity was depressed by the acid drainage; mid-portions of the stream had d values in the range of 1.8 to 2.8. Eight miles below the drainage region aquatic communities had recovered with d values greater than 3.0. The effect of the acid drainage varied with stream discharge. Low flow conditions in mid-summer showed a downstream shift in the effects of the acid drainage. Increases in d occurred after the confluence with unpolluted tributaries. The tributaries had the dual effect of improving water quality either by dilution or chemical reaction, and supplying organisms for the recolonization of damaged sections of the stream. The major mechanism of recolonization seems to be the downstream drift of organisms.
W72-11386

PHOSPHORUS LOADING FROM A MULTI-LAND USE WATERSHED,
Marquette Univ., Milwaukee, Wis. Water Resources Center.
R. C. Kapur.
M. S. Thesis, 1970. 94 p, 9 fig, 14 tab, 31 ref, append. OWRR A-014-WIS (2).

Descriptors: *Eutrophication, *Watersheds (Basins), *Phosphates, *Water pollution sources, Phosphorus compounds, Runoff, Fertilizers, Streams, Land use, Watershed management, Farm wastes, Lake Michigan, Wisconsin, Precipitation (Atmospheric).
Identifiers: *Phosphorus loading, *Menomonee River.

The Menomonee River watershed is a multi-land use watershed of 135 square miles area tributary to Lake Michigan. Approximately 370,000 people reside in the watershed which is 38 percent agricultural, 23 percent residential, and the remainder divided amon g the other land-use categories. Fifteen sampling sites were selected to evaluate the phosphorus loading from the watershed during various times of the year. During the two-year investigation period, 30 sampling surveys were conducted and the samples were analyzed for total soluble phosphorus. A statistical investigation of the data showed that the phosphate concentration could not be correlated with precipitation amount, whereas, phosphorus pound loading could. The amount of phosphorus conveyed by runoff during precipitation periods varied considerably depending upon the amount of precipitation; varying from negligible amounts during low precipitation periods to high value of 83 pounds of phosphate per day per square mile during high precipitation periods. It was estimated that 1,250 pounds per day of phosphate are discharged into Lake Michigan from the Menomonee River watershed, of which 40 percent is from treatment plant effluents.
W72-11390

CLOSTRIDIUM BOTULINUM IN THE GREAT LAKES,
Wisconsin Univ., Madison. Food Research Inst.
H. Sugiyama, T. L. Bott, and J. A. Soucheck.
Spores V, p. 314-317. 3 tab, 16 ref. 1972. OWRR A-026-WIS (2).

Descriptors: *Clostridium, Ecology, *Aquatic plants, *Bacteria, *Toxins, *Invertebrates, Shores, Freezing, Fish, Wisconsin, *Botulism, Great Lakes, Water pollution sources, *Great Lakes.
Identifiers: *Clostridium botulinum type E, *Food poisoning, *Green Bay (Wis).

Green Bay was taken as the model to study the source of Clostridium botulinum type E which contaminates fish of the Great Lakes to create a botulism hazard. Certain bottom deposits held in the laboratory after a freeze-thaw treatment supported the growth of type E (50 or more fold increase in most probable numbers). Without the freeze treatment the specimens did not support growth. Productive samples always contained vegetation and were those collected during the warm months. When placed in columns to obtain depth, artifically induced anaerobic conditions were not needed. Emphasis is placed on the similarity of the type E data to the ecology of C. botulinum type C, the cause of western duck sickness. The primary substrates in which type E multiplies is believed to be the macro-invertebrates associated with the aquatic vegetation that grow in the shallow shore line of Green Bay. Bacteriophages isolated from the Green Bay system have host ranges limited to nonproteolytic C. botulinum strains that produce type B, E, or F

toxin; they do not lyse proteolytic cultures producing type A, B, or F toxin. Clostridia which are type E by criteria other than toxin production are present in the Great Lakes.
W72-11392

THE DESIGN OF A CONTINUOUS FLOW BIOLOGICAL EARLY WARNING SYSTEM FOR INDUSTRIAL USE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05G.
W72-11393

TOXICOLOGIC METHODS FOR ESTABLISHING DRINKING WATER STANDARDS,
Robert A. Taft Sanitary Engineering Center, Cincinnatti, Ohio.
For primary bibliographic entry see Field 05G.
W72-11397

VEGETATION OF THE BOGS OF THE OKA--ZIMA INTERFLUVE IN IRKUTSK OBLAST,
For primary bibliographic entry see Field 02I.
W72-11403

UTILIZATION OF BIOGENIC ELEMENTS BY A PHYTOPLANKTON COMMUNITY DEPENDING ON THEIR CONCENTRATION IN THE AQUATIC ENVIRONMENT AND ILLUMINATION CONDITIONS,
Moscow State Univ., (USSR).
V. D. Fedorov, T. I. Belaya, and V. N. Maksimov.
Izv Akad Nauk SSSR Ser Biol. 3. p 398-414. 1970. Illus. (English summary).
Identifiers: Aquatic environment, *Biogenic elements, Concentration, Illumination, Iron, Nitrogen, Phosphorus, *Phyto plankton.

Utilization of biogenic elements by a biomass unit of phytoplankton increases depending on the concentration of these elements in the surrounding media. An increase in P concentration decreases N consumption. An increase in concentration of P and Fe causes a reciprocal consumption of each element. A doubling of illumination decreased consumption of all 3 elements.--Copyright 1972, Biological Abstracts, Inc.
W72-11406

THE ROLE OF THE GROWTH OF PHYTOPLANKTON UNDER ICE IN PRODUCING ORGANIC MATTER IN LAKE BAIKAL,
K. K. Botintsev.
Zap Zabaik Fil Geogr O-Va SSSR. 40 p 115-117. 1970.
Identifiers: *Lake Baikal, Biomass, Growth, Ice, Lakes, *Organic matter, Melosira, Peridineans, *Phytoplankton, Population, Production, Size, USSR.

The growth of algae spring forms under ice in Lake Baikal begins at the end of Feb. or the beginning of March. In some years of the dominants were species of Melosira or thinwalled peridinean algae. The maximum population size and biomass of these algae occurred from the middle of April into May. The role of phytoplankton growth under ice in general production process in the lake was different in different years and depended on composition and quantitative development of the algae. The production of phytoplankton during the ice period amounted to 34% of the total annual primary production in Lake Baikal in 1964, when ther was a high level of Melosira. In 1965, with the mass development of peridineans, it was 45%, and in 1966, when the phytoplankton were unproductive, it was only 9%. The maximum value of the utilization coefficient (up to 2.5-3% of the incident radiation) was noted at the time of the mass vegetation of peridineans.--Copyright 1972, Biological Abstracts, Inc.
W72-11409

THE EFFECT OF LIGHT ON THE PHOTOSYNTHESIS RATE OF THE PHYTOPLANKTON OF THE SUPERFICIAL STRATA OF THE WATER,
V. I. Romanenko, and A. S. Daukshta.
Biol Vnutr Vod Inform Byull. 3. p 10-12. 1969.
Identifiers: Carbon, Depth, *Light, *Photosynthesis, Phytoplankton, Rates, Strata, Transparency.

Observations were made at the Rybinsk Reservoir in the summer of 1966 and 1967, and also in some Latvian lakes in 1967. The series of analyses pertains to the superficial 1-m stratum, where samples were taken every 5-10 cm. The experiments were carried out during a period of intensive algal development. The radiocarbon method was used to determine the photosynthesis rate. The maximum such rate for water with a transparency of 1-2 m was noted at a depth of 10-25 cm, where the rates were 3-6 times as high as at the surface. With an increase in depth to 0.5 m there was a sharp decrease in the photosynthesis rate with a subsequent more gradual decrease. In waters with a transparency of 2-5 m the maximum rate was noted at greater depths and was less marked than in waters with lower transparency. The maximum photosynthesis rate in the thin superficial layers of water is not always observed; when it does occur it is at times of the maximum algal development or maximum insolation. When an analysis is made of the photosynthesis rate in summer with greater separation (0.5-1 m) between the bottles, the point of maximum photosynthesis may lie between them.--Copyright 1972, Biological Abstracts, Inc.
W72-11411

EFFECT OF DURSBAN IN THE DRINKING WATER OF CHICKS,
Manitoba Univ., Winnipeg. Dept. of Entomology.
R. A. Brust, S. Miyazaki, and G. C. Hodgson.
J Econ Entomol. Vol 64, No 5, p 1179-1183. 1971. Illus.
Identifiers: *Poultry, Blood, *Dursban, Cholin esterase, Water pollution effects.

The insecticide Dursban (0,0-diethy 0- (3,5,6-trichloro-2-pyridyl) phosphorothioate), was added to the drinking water of young Leghorn cockerels at 8 levels ranging from 0.08 to 1280 ppm active ingredient. Experiments were begun with chicks 3 or 5 days old and were concluded after 3 and 4 wk. Mortality at 80 ppm was 20%, and mortality at 320 and 1280 ppm was 100%. No adverse effects were apparent at lower levels. Solvent and inert ingredients of Dursban emulsifiable concentrate had no adverse effect on the chicks up to 717.7 ppm. Cholinesterase activity in whole blood was monitored at all treatment levels, and the activity decreased at 80 ppm Dursban and above. At lower levels there was no significant difference from the controls. Weight gain/day diminished with increased levels of Dursban. Starvation of treated chicks did not affect blood-cholinesterase activity.--Copyright 1972, Biological Abstracts, Inc.
W72-11412

NA+, K+-ACTIVATED-ATPASE INHIBITION IN RAINBOW TROUT: A SITE FOR ORGANOCHLORINE PESTICIDE TOXICITY,
Washington Univ., Seattle. School of Medicine.
P. W. Davis, and G. A. Wedemeyer.
Comp Biochem Physiol B Comp Biochem. Vol 40, No 3, p 823-827. 1971. Illus.
Identifiers: *Enzymes, ATPase, Chlorine, DDT, Dicofol, Endosulfan, Inhibition, Ions, Ouabain, Pesticides, Potassium, *Rainbow trout, Salmo gairdneri, Sites, Sodium, Toxicity, *Pesticide toxicity, *Chlorinated hydrocarbon pesticides.

The Na+, K+-activated, Mg2+-dependent-ATPase enzyme system in a heavy microsomal fraction of rainbow trout (Salmo gairdneri) brain was inhibited in vitro by chlorinated hydrocarbon pesticides. I50 (concentration at 50% inhibition) values for dicofol, endosulfan and DDT were 5 x 10 to the minus 6th power, 3 x 10 to the minus 5th power and 1 x 10 to the minus 4th power M, respectively. Similar inhibition by these pesticides occurred in kidney and gill ATPase preparations. An unexpected finding was a failure of the classic inhibitor, ouabain, to block the Na+, K+-activated component of ATPase activity in the gill. Inhibition of ATPase activity may be a causal factor in the toxic effects of organochlorine pesticides in fishes.--Copyright 1972, Biological Abstracts, Inc.
W72-11415

THE SEASONAL DYNAMICS OF VITAMIN B12 AND PHYTOPLANKTON VARIABILITY IN THE DALNEZELENETSKAYA GUBA (INLET) OF THE BARENTS SEA,
Murmanskii Morskoi Biologicheskii Institut (USSR).
L. N. Propp.
Okeanologiya. Vol 10, No 5, p 851-857. 1970. Illus. English summary.
Identifiers: *Vitamin B-12, *Barents Sea, Dynamics, Fluctuations, Inlets, Leptocylindrus danicus, Nitzschia spp, Nutrition, *Phytoplankton, Population, Seasonal, Skeletonema costatum, USSR, Variability, *Vitamins.

The monthly data obtained by the microbiological method averaged for the surface and near-bottom layers (32 to 36 m) show 2 maxima: the greater maximu, 2.16 mg/L, is observed in winter (Feb.) and the smaller maximum, 1.32 mg/L, is recorded in autumn (late Sept.-early Oct.). A simultaneous determination of phytoplankton numbers and specific composition and their comparison with vitamin content confirmed the possible ecological role of vitamin B12 and its control of algal succession. The zero vitamin B12 content in Aug. 1967, could be the result of an unusual vegetation of Skeletonema costatum, which is auxotrophic with respect to vitamin B13. Nitzschia species also reached their maximum development at this time. One of the species does not need vitamin B12. The winter maximum can be attributed to a gradual accumulation of the vitamin when algal vegetation is practically absent; the autumn maximum is explained by the decay of summer detritus and, to a lesser degree, by a disturbance of the density stratification of water masses. A comparison between the distribution of phosphate and nitrite and the vitamin content revealed similar trends. The sharp increase of nitrite which coincided with the autumn reduction of the vitamin indicates the existence of trophic relations between nitrite, bacteria and B12 vitamin. The competition between S. costatum and Leptocylindrus danicus, resulting in the equilibrium of their numbers is evidence that the latter uses vitamin B12 or one of its analogues.--Copyright 1972, Biological Abstracts, Inc.
W72-11421

SURVEY OF THE PLANT ASSOCIATIONS OF THE SOUTHERN PART OF EAST GERMANY: I. THE ASSOCIATIONS OF AQUATIC PLANTS,
W. Hilbig.
Hercynia. Vol 8, No 1, p 4-33, 1971.
Identifiers: Aquatic plants, *Germany, Macrophytes, Survey.

Aquatic plants from Thuringia, and central and western Saxony are discussed. The Spirodelo-Lemnetum minoris association is the most common one of the Lemnion minoris union. The Spirodelo-Salvinietum is limited to the warm central Elbe valley. While the center of distribution of Lemnetum gibbae is in eutrophic pools, Riccietum gluitantis is found mainly in fish ponds on poor subsoil. The Hydrocharition union is most strongly represented by Hydrocharitetum. The Lemno-Utricularietum was found in meadows in the central Elbe, lower Mulde and Elster-Luppe Meadow areas. The Utricularietum neglectae was found on the borders of the central mountain area, the Obersaale-Oberelster area and the Lausitz pool area. Ceratophylletum demersi, found in eutrophated old river beds and ponds, occurs more frequently. The numerous, but species-poor associations of Potamogetonion were characterized by the dominance of pondweed (Potamogeton). Of the

floating leaf associations of Nymphaeion, Myriophyllo-Nupharetum dominates. In higher and poorer areas Nymphaeetum albae and Polygono-Potamogetonetum natantis occur. Trapetum natantis and Ranunculetum aquatilis are limited to the central Elbe area and surrounding rivers and ponds, where the former populates deep parts of old river beds and pools and the latter populates flat, partially dried up eutrophic small ponds and ditches. In the upper acid regions of a river Callitricho (hamulatae)-Ranunculetum develops. In the center of the river Ranunculetum fluitantis is found in the Sparganium emersum Subassociation or is replaced by the Sparganium emersum-Potamogeton pectinatus association. In the brine pits near Artern/Unstrut stands of Ruppia maritima form. These belong to the Ruppietum maritimae.--Copyright 1972, Biological Abstracts, Inc.
W72-11429

ADVANCES IN ECOLOGICAL RESEARCH, VOL. 7.
For primary bibliographic entry see Field 06G.
W72-11524

DISTRIBUTION, PRODUCTION AND ROLE OF AQUATIC MACROPHYTES IN A SOUTHERN MICHIGAN MARL LAKE,
Michigan State Univ., Hickory Corners, Mich. W. K. Kellogg Biological Station.
P. H. Rich, R. G. Wetzel, and Nguyen-van-Thuy.
Freshwater Biology, Vol 1, p 3-21, 1971. 10 fig, 5 tab, 35 ref.

Descriptors: *Distribution, *Productivity, *Aquatic plants, *Michigan, *Marl, Lakes, Seasonal, Chara, Biomass, Bulrushes, Pondweeds, Plant populations.
Identifiers: *Lawrence Lake (Michigan), Scirpus subterminalis, Potomogeton, Nitella flexilis, Utricularia, Najas flexilis, Nuphar variegatum, Brasenia schreberi, Lemna minor, Ceratophyllum demersum, Myriophyllum heterophyllum.

Spatial and seasonal distribution of macrophytic species and biomass was studied and species listed in Lawrence Lake, Michigan, a typical marl lake. Macrophytes dominate the total primary production. Submersed vegetation is extremely sparse on the shallow marl bench and is completely dominated by Scirpus subterminalis between 1-7 m. Two species of Chara are present in significant quantities, but are severely limited to shallow depths and protected areas. Several annual submersed angiosperms are present but only two species quantitatively important, Potamogeton illinoensis and P. praelongus. A striking feature of the seasonal biomass distribution of Scirpus subterminalis is the higher, viable biomass throughout the winter under ice cover. Cyclic fluctuations of the S. subterminalis populations were discerned at different depths, each with different periodicities. Estimates of macrophytic productivity of perennial species populations whose biomass remains relatively constant throughout the year were made employing several methods of calculation and turnover factors. The low diversity but relatively high quantitative importance of macrophytes in marl lakes is attributed to an adverse dissolved inorganic and organic chemical milieu which inhibits phytoplanktonic production and allows only certain adapted macrophytes to develop strongly. (Jones-Wisconsin)
W72-11561

MICROBIOLOGICAL STUDIES ON NITROGEN FIXATION IN AQUATIC ENVIRONMENTS--VII. SOME ECOLOGICAL ASPECTS OF NITROGEN FIXING BACTERIA,
Kyoto Univ. (Japan). Research Inst. of Food Science; and Mie Prefectural Univ. Tsu (Japan).
A. Kawai, and I. Sugahara.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 38, No 3, p 291-297, 1972. 3 fig, 1 tab, 7 ref.

Descriptors: *Microbiology, *Nitrogen fixing bacteria, *Nitrogen cycle, Environmental effects, Anaerobic conditions, Nitrates, Denitrification, Bottom sediments, Sea water, Freshwater, Ammonia, Eutrophication, Oxidation, Symbiosis, Azotobacter, Marine algae, Organic matter.
Identifiers: Nitrosomonas, Nitrobacter, Azotobacter.

The occurrence and abundance of bacteria responsible for nitrogen metabolism form a peculiar pattern for each water region. The number of each bacteria group having the ability to perform the following processes in the nitrogen cycle was counted in the water and bottom sediments of various regions: ammonification, nitrate reduction, denitrification, nitrification. The relationship is close between the number of nitrogen fixing bacteria occurring in the water and bottom sediments of various fresh water regions and that of nitrate reducers and denitrifiers. The growth of the three bacteria groups may be controlled by the same environmental factors, presumably concentration of available organic matter. This relationship was not obtained in sea water regions where amount of organic matter is considerably poorer. Bacterial adhesion on the suspended matter present in water regions was studied; water samples were treated with sonic oscillation and the bacteria counted. It may be that many nitrogen bacteria occur, together with the other heterotrophs, on or in the suspended particles and utilize the particle components as nutritional sources. In general, a dense bacterial biomass is found in fresh water environments, the population decreasing gradually from coastal to offshore regions. (See also W72-07513, W72-05472, W72-05164, W72-07948, and W72-07511) (Jones-Wisconsin)
W72-11563

A SHOCK-WAVE TECHNIQUE TO COLLAPSE THE VACUOLES OF BLUE-GREEN ALGAE,
University of Wales Inst. of Science and Tech., Cardiff.
For primary bibliographic entry see Field 05G.
W72-11564

CHEMOAUTOTROPHY IN NITRIFYING BACTERIA,
Indian Agricultural Research Inst., New Dehli. Div. of Biochemistry.
P. S. Rao, and M. S. Naik.
Journal of Scientific and Industrial Research, Vol 39, p 588-592, 1971. 1 tab, 45 ref.

Descriptors: *Biochemistry, *Nitrification, *Bacteria, Oxidation, Phosphorus, Nitrites, Cytological studies, Nitrogen compounds.
Identifiers: *Chemoautotrophy, Nitrobacter, Nitrosomonas, Phosphorylation.

This review of biochemistry of the Nitrosomonas and Nitrobacter bacteria, important not only for nitrification, but also for chemoautotrophic nature in which carbon dioxide serves as sole source of carbon for growth, emphasizes the biochemical reactions in chemoautotrophy. Utilization of oxidation energy for generation of reducing power, which enables these organisms to assimilate carbon dioxide, is a uniquely characteristic process in chemoautotrophy. In nitrifying bacteria, the oxidation of simple compounds, ammonia or nitrite, provides ATP, since oxidation reactions are associated with the particulate fraction containing electron carriers. Reduced pyridine nucleotides are generated by reversal of electron flow. ATP and NADH are utilized for carbon dioxide assimilation through Calvin cycle enzymes. The dark reactions of photoautotrophy are identical with those of chemoautotrophs. The main difference consists in replacement of the light reaction of photosynthesis by oxidation of ammonia or nitrite. The biochemical basis of chemoautotrophy rests on inability of the bacteria to use glucose as an energy source and low Krebs cycle and NADH oxidase activities. As in photoautotrophs, carboxydismutase accounts for a major portion of carbon dioxide fixation. Other pathways involving phosphoenolpyruvate carboxylase are also operative. (Jones-Wisconsin)
W72-11565

SOME RELATIONS OF LAND DRAINAGE, NUTRIENTS, PARTICULATE MATERIAL, AND FISH CATCH IN TWO EASTERN CANADIAN BAYS,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
W. H. Sutcliffe, Jr.
Journal Fisheries Research Board of Canada, Vol 29, No 4, p 357-362, 1972. 7 fig, 25 ref.

Descriptors: *Surface runoff, *Nutrients, *Fisheries, *Bays, Suspended solids, Carbon, Nitrogen, Organic matter, Microorganisms, Productivity.
Identifiers: *Gulf of St. Lawrence (Canada), *St. Margaret's Bay (Nova Scotia), Seaweeds.

In preliminary investigations on primary productivity and nutrient features of St. Margaret's Bay, Nova Scotia, water samples were collected from September 1968 through August 1969 at approximately 2-week intervals and filtered through 0.45 micron membrane filters for ATP analysis or through 0.8 micron silver filters for particulate carbon and nitrogen determinations. For size fractionation, some samples were first poured through 10 micron nylon mesh or through a 5 micron silver filter with 50% retention effective at about 8 microns and 2 micron, respectively. ATP samples were frozen immediately; samples for particulate carbon were vacuum desiccated. Laboratory analysis showed a large portion of living material less than 8 microns in size; the bacterial fraction is likely underestimated. The carbon content of living and carbon and nitrogen content of nonliving suspended particulate material for the year is given. The nitrogen budget is compared with the carbon-nitrogen ratios and nutrient data from other sources. Positive correlations between runoff and catch of four commercially important species points to importance of runoffs. Correlations between the physical parameters and biological production do not suggest simple control. (Jones-Wisconsin)
W72-11566

OBSERVATIONS ON THE NITROGEN-FIXING POTENTIAL OF THE PLANKTON OF TWO FARM PONDS,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
D. W. Toetz.
The American Midland Naturalist, Vol 87, No 2, p 555-559, 1972. 3 tab, 8 ref.

Descriptors: *Nitrogen fixation, *Plankton, *Analytical techniques, Farm ponds, Aquatic plants, Organic matter, Cyanophyta, Chlorella, Microorganisms, Detritus, Phytoplankton, *Oklahoma.
Identifiers: Acetylene reduction, Anacystis cyanea, Oscillatoria, Aphanizomenon holsaticum.

Using the N-15 technique and the acetylene reduction, with observations of environmental conditions and phytoplankton, the nitrogen fixation potential of the open water of two farm ponds in central Oklahoma was studied. After initial use of the N-15, the acetylene reduction was substituted because of its low cost and greater sensitivity. Uptake of nitrogen was not observed in either pond. Nonheterocystous blue-green algae such as Anacystis cynea and Oscillatoria dominated the flora of Pond A during the summer and Chlorella during the winter. The isotope ratios of nitrogen in organic matter in pond water exposed to 90% N-15 fell within the 95% confidence intervals for nitrogen blanks. Nitrogenase activity was detected during the winter in the pond where Ceratophyllum and Nelumbo were the dominant macrophytes, due perhaps to Aphanizomenon holsaticum, but microbial fixation cannot be excluded, especially in absence of dense algal blooms. It might be that detritus, usually abundant

during the winter, was utilized as a substrate by nitrogen fixing microbes. The open water of these ponds appears to be an unfavorable site for nitrogen fixation, although more frequent observations may reveal greater nitrogen fixing potential. (Jones-Wisconsin)
W72-11567

EFFECTS OF VOLCANIC ASHFALLS ON CHEMICAL AND SEDIMENT CHARACTERISTICS OF TWO ALASKAN LAKES,
Alaska Univ., College, Inst. of Marine Science; and Washington Univ., Seattle, Dept. of Oceanography.
For primary bibliographic entry see Field 02H.
W72-11569

ACID-IRON WASTE DISPOSAL AND THE SUMMER DISTRIBUTION OF STANDING CROPS IN THE NEW YORK BIGHT,
Woods Hole Oceanographic Institution, Mass.
R. F. Vaccaro, G. D. Grice, G. T. Rowe, and P. H. Wiebe.
Water Research, Vol 6, p 231-256, 1972. 4 fig, 8 tab, 37 ref.

Descriptors: *Industrial wastes, *Bays, *Waste disposal, *Water pollution effects, *New York, Heavy metals, New Jersey, Acids, Iron, Biota, Toxicity, Standing crops, Sediment, Zooplankton, Benthic fauna, Phytoplankton, Copepods, Trace elements, Benthos, Physicochemical properties.
Identifiers: *Acid-iron wastes, *New York Bight.

Hydrographic, chemical and biological conditions in coastal waters of the New York Bight where 50 million tons of acid-iron industrial waste were dumped over 22 years were studied and compared with those of a nearby control area. The maximum persistent iron concentration on the acid disposal grounds have a minimum dilution of the acid wastes of 1:39,000. There is no indication of an increase of iron in sediments of the past 14 years. Although standing crops of zooplankton and benthic animals were less on acid grounds than on the control areas, these differences were not attributed to acid waste. A phytoplankton toxicity experiment, carried out in a culture containing a concentration four times greater than in the field, had no effect on phytoplankton growth. Copepods were studied in seawater cultures containing acid waste; copepods either failed to reproduce or their development was prolonged in a 0.0001 concentration; no adverse effects were noted at lower concentrations. Comparison of the acid and control areas showed the highest values for eight trace metal concentrations in zooplankton, benthos, and sediments. No major effects of acid-iron waste on sediment and biota were detected. (Jones-Wisconsin)
W72-11570

THE EFFECTS OF SAPROBIC CONDITIONS ON SOME CILIATED PROTOZOA IN THE BENTHOS AND HYPOLIMNION OF A EUTROPHIC POND,
Freshwater Biological Association, Ambleside (England).
R. Goulder.
Freshwater Biology, Vol. 1, p 307-318, 1971. 5 fig, 3 tab, 27 ref.

Descriptors: *Anaerobic conditions, *Aquatic populations, *Protozoa, *Benthos, Hypolimnion, Seasonal, Fluctuations, Decomposing organic matter, Stratification, Oxygen, Toxicity, Ammonia, Carbon dioxide, Sulfides, Hydrogen ion concentrations, Alkalinity, Hydrogen sulfide, Water pollution effects.
Identifiers: Loxodes magnus, Loxodes striatus, Frontonia leucas, Spirostomum teres, Stentor coeruleus, Paramecium caudatum, Priest Pot (England).

Ciliate populations in benthos and hypolimnion of a eutrophic pond, Priest Pot, Lancashire, England, and their seasonal fluctuations were followed, May 1969 to December 1970. Loxodes magnus and Loxodes striatus were the most common species; Frontonia leucas, Spirostomum teres, Stentor coeruleus, and Paramecium caudatum were counted. Dense benthic populations of these ciliates were found in 0.1 ml of sediment, October to May, when pond was mixed and bottom water well oxygenated. Very few benthic ciliates were present in summer when stratification occurred, the hypolimnion containing low oxygen and high levels of potentially toxic substances such as sulphide, ammonia, and carbon dioxide. Water column conditions were perhaps less severe than sediment or the planktonic ciliates may have migrated vertically at times to an oxygen supply at the epilimnion boundary. Effect of an artificial saprobic environment was investigated. Loxodes species exposed to saprobic conditions in closed bottles were lost 50-150 hours. Deoxygenation carried out in an argon stream, with no build-up of the potential toxins associated with anoxia, killed nearly all Loxodes between 20 and 70 hours. Oxygen deficiency alone may explain low populations. (Jones-Wisconsin)
W72-11571

THE EFFECT OF CUPRIC AND FLUORIDE IONS IN THE RESPIRATION OF CHLORELLA,
University of Western Ontario, London (England). Dept. of Biophysics.
D. F. Sargent, and C. P. S. Taylor.
Canadian Journal of Botany, Vol. 50, p 905-907, 1972. 2 tab, 7 ref.

Descriptors: *Algal control, *Respiration, *Chlorella, *Inhibition, Copper, Fluorides, Ions, Cytological studies, Water pollution effects.
Identifiers: Chlorella pyrenoidosa.

Simulataneous application of cupric and fluoride ions virtually stops respiration of Chlorella vulgaris, although either cupric or fluoride ions alone cause no inhibition. Tests with various combinations of cupric and fluoride ions were made for endogenously respiring Chlorella pyrenoidosa. The sum of the inhibitions caused by cupric and fluoride ions individually is much less than the inhibition found when both agents are present. This work indicates that cupric ions alone do not block the alternate dissimilation pathway, but that both cupric and fluoride ions are required to inhibit completely. The response depends on the order of addition and the time between additions of the two poisons. The response to added cupric decreases as the time since the addition of fluoride ions increases. In Chlorella poisoned by dichlorophenyldimethylurea there is a light-induced respiratory inhibition which depends upon the functioning of glycolysis and which is suppressed by such glycolytic inhibitors as fluoride ions and iodoacetate. When fluoride ions are used, the light-induced inhibition gradually reappears, until, after an 80-minute incubation with fluoride, the effect is as great as before fluoride was added. Clearly glycolysis is no longer inhibited. (Jones-Wisconsin)
W72-11572

SUMMER BENTHOS IN NEWLY FLOODED AREAS OF BEAVER RESERVOIR DURING THE SECOND AND THIRD YEARS OF FILLING 1965-1966,
Bureau of Sport Fisheries and Wildlife, Fayetteville, Ark. South Central Reservoir Investigations.
L. R. Aggus.
In: Reservoir Fisheries and Limnology, p 139-152. Special Publication No. 8, American Fisheries Society, Washington, D.C., 1971. 2 fig, 5 tab, 20 ref.

Descriptors: *Productivity, *Diptera, *Benthos, *Reservoirs, Bank erosion, Biomass, Vegetation effects, Fish, Impoundments, Deposition (Sediments), Silting, Autogenic succession, Fish food organisms, *Arkansas.
Identifiers: *New impoundments, *Beaver Reservoir (Ark), White River (Ark).

The creation of Beaver Reservoir on the White River in northwest Arkansas provided an opportunity to follow benthos formation in a large Ozark impoundment. Multiple-plate samplers were used during June-September 1965 and 1966 to obtain indexes to benthos production in areas of recently flooded herbaceous vegetation, timber, and cleared areas of Beaver Reservoir. Benthos accumulation on samplers was highest in flooded herbaceous vegetation during the early summer each year, followed by a strong seasonal decline. The most numerous during the early summer each year were the chironomids, the numerical benthic dominants on plate samplers throughout the study. Emergence traps indicated specimens of Glyptotendipes lobiferus and G. meridionalis to be dominant chironomid forms during the summer of 1965, decreasing in abundance during 1966, while Polypedilum digitifer and several undetermined species of Tanytarsini increased. Changes in the abundance of these chironomids coincided with a conspicuous increase in the rate of shoreline erosion and redeposition. Certain benthic forms appeared to be responsive to flooding of herbaceous vegetation; these organisms may represent a major avenue of energy transfer directly from decaying vegetation to fish. (Jones-Wisconsin)
W72-11573

THE LIMNOLOGICAL ROLE OF AQUATIC MACROPHYTES AND THEIR RELATIONSHIP TO RESERVOIR MANAGEMENT,
Atomic Energy Commission, Aiken, S.C. Savannah River Ecology Lab.
C. E. Boyd.
In: Reservoir Fisheries and Limnology, p 153-166. Special Publication No. 8, American Fisheries Society, Washington, D.C., 1971. 2 fig, 90 ref.

Descriptors: *Aquatic plants, *Reservoirs, *Management, Phytoplankton, Standing crops, Food chains, Phosphorus, Cattails, Nutrients, Rooted aquatic plants, Cycling nutrients, Foods, *Water hyacinth, Herbicides, Submerged plants, Floating plants, Aquatic weed control.
Identifiers: *Water lettuce, Nelumbo lutea, Alternanthera philoxeroides, Saururus, Salvinia rotundifolia, Hydrilla verticillata, Justicia americana, Ceratophyllum demersum.

The limnology of aquatic plants is presented to encourage management rather than eradication of macrophyte communities in reservoirs. In warm climates, floating vascular plants such as water hyacinth or water lettuce may completely cover a reservoir surface. Degree of cover and macrophyte production are regulated by nutrients, space for growth, and a propagule source; they are important in aquatic ecosystem food webs. The proportion of total primary production attributed to macrophytes will vary with the growth suitability of the system. Although herbicide treatments of large portions of reservoirs are not recommended, localized plant stands can be controlled quite well. Invading species can sometimes be eliminated and obstructing vegetation eradicated from specified areas. Biological agents may have potential in controlling certain species, and mechanical removal of vegetation works well in certain situtations. Where feasible, water level manipulation is one of the best control techniques. Excessive macrophyte production represents a potential food supply; leaf protein concentrate suitable for use in human diets can be prepared in satisfactory quantities from a number of macrophytes; economically valuable livestock feeds can be prepared from plants harvested for purpose of nutrient removal. (Jones-Wisconsin)
W72-11574

PHYTOPLANKTON PRODUCTIVITY IN A WYOMING COOLING-WATER RESERVOIR,
Utah Univ., Salt Lake City. Dept. of Biology.
W. H. Funk, and A. R. Gaufin.

In: Reservoir Fisheries and Limnology, p 167-178. Special Publication No 8, American Fisheries Society, Washington, D.C., 1971. 2 fig, 6 tab, 17 ref.

Descriptors: *Phytoplankton, *Productivity, *Reservoirs, Nutrients, Eutrophication, Limiting factors, Fish harvest, Stratification, Rainbow trout, Dissolved oxygen, Chlorophyll, Diatoms, Primary productivity, Physicochemical properties, *Wyoming.
Identifiers: *Lake Viva Naughton (Wyo).

The productivity of Lake Viva Naughton, a newly impounded reservoir at Kemmerer, Wyoming, was investigated in a study of plankton: the ecological succession, the available mineral nutrients and the physical characteristics enhancing growth, trends of planktonic productivity by C-14 uptake and by other methods such as oxygen evolution and chlorophyll analysis. Algal blooms did not occur immediately after filling the reservoir in 1961, but Pandorina morum and Aphanizomenon flos-aquae became prevalent in the early summer months of 1962. The reservoir is not stratified during the summer growing season, as wind action causes constant circulation of the water. Macro- and micronutrients were in sufficient quantity to support algal blooms at any time. Reduction of nutrients and decreased light penetration by sheer cell density apparently represent the main limiting factors of algal growth. Temperature, addition or dilution of nutrients by precipitation and runoff may be limiting factors. Spawning adult rainbow trout, trapped above the dam after closure, and fish planted by the Wyoming Fish and Game Department, provided phenomenal fishing during 1962-1965. (Jones-Wisconsin)
W72-11575

EFFECTS OF STORAGE AND MAINSTREAM RESERVOIRS ON BENTHIC MACROINVERTEBRATES IN THE TENNESSEE VALLEY,

Tennessee Valley Authority, Muscle Shoals, Ala. Environmental Biology Branch.
B. G. Isom.
In: Reservoir Fisheries and Limnology, p 179-191. Special Publication No. 8, American Fisheries Society, Washington, D.C., 1971. 1 fig, 9 tab, 47 ref.

Descriptors: *Reservoirs, *Benthic fauna, *Invertebrates, *Tennessee Valley Authority, Silting, Water level fluctuations, Hydrostatic pressure, Oxygen, Food chains, Fisheries, Mussels, Snails, Insects, Mollusks, Fish populations, Fish food organisms, Rainbow trout.
Identifiers: *Storage reservoirs, *Macroinvertebrates, Clinch River (Tenn), Norris Dam (Tenn).

Although the literature analyzing benthic macroinvertebrates in the Tennessee Valley over the past 50 years is limited, there are sufficient studies for comparison with postimpoundment research. Virtually all benthic fauna have been eliminated from storage impoundments in the Valley, but some seasonal colonization of shallow overbank areas has occurred. Below mainstream impoundments the benthic fauna includes mussels and residual populations of Pleuroceridae. The short plankton-to-fish food chain is characteristic. The seasonally low oxygen tension below some impoundments may limit benthic fauna. Recent decline of mussel populations is attributed to impoundment and overharvest. Few Unioninae but significant numbers of Anodontinae and Lampsilinae have colonized postimpoundment mud-sand shallows. The decline of Unionidae may have been caused by fish-host association changes. Habitat alterations as a result of impoundments are associated with decline of snail populations in the upper Tennessee River drainage and of Pleuroceridae throughout the Valley. The Asiatic clam (Corbicula manilensis) accidentally introduced, although somewhat of a pest, is utilized by a number of faunal associates. It has been the most successful invader of impoundments on the Tennessee River and some of its tributaries. (Jones-Wisconsin)
W72-11576

PHYTOPLANKTON PRODUCTIVITY RESPONSE TO NUTRIENTS CORRELATED WITH CERTAIN ENVIRONMENTAL FACTORS IN SIX TVA RESERVOIRS,

Tennessee Valley Authority, Muscle Shoals, Ala. Environmental Biology Branch.
M. P. Taylor.
In: Reservoir Fisheries and Limnology, p 209-217. Special Publication No. 8, American Fisheries Society, Washington, D.C., 1971. 7 fig, 3 tab, 6 ref.

Descriptors: *Phytoplankton, *Productivity, *Nutrients, *Reservoirs, Tennessee Valley Authority, Water quality, Fish populations, Retention, Oxygen, Physical properties, Lake morphology, Thermal stratification.
Identifiers: *Tennessee Valley reservoirs, Storage reservoirs, Mainstream reservoirs, Tributary reservoirs.

To evaluate phytoplankton productivity rates, nutrient concentrations, certain environmental factors, and some resultant effects, six reservoirs, typical of the Tennessee Valley, were studied. With their contrasting nutrient and productivity values, they illustrate representative reservoir types: mainstream, storage, and tributary. Considerable annual variation in phytoplankton productivity occurred both within each reservoir and among all six. Excessive phytoplankton productivity in some reservoirs is a factor in low oxygen content of water discharged through turbines, thus contributing to altered water downstream. This low-oxygen water phenomenon can exist in every deep storage reservoir but may be intensified in those supporting a heavier phytoplankton population. Short water retention time affects mainstream reservoir productivity by limiting time for phytoplankton growth; long water retention time of storage impoundments and of Beech Reservoir, a multipurpose tributary reservoir, provides more phytoplankton growth time. Lake morphology is important in a comparison of storage and mainstream impoundments because thermal stratification and the deep water withdrawal from storage impoundments permit separate aging of the hypolimnetic and epilimnetic strata. In mainstream impoundments, nutrients sink into a deoxygenated hypolimnion, sealed from the surface by the thermocline. Release occurs only through turbines or by fall and winter overturn. (Jones-Wisconsin)
W72-11578

MACROBENTHOS OF THE PAMLICO RIVER ESTUARY, NORTH CAROLINA,

North Carolina State Univ., Raleigh. Dept. of Zoology.
K. R. Tenore.
Ecological Monographs, Vol. 42, No. 1, p 51-69, 1972. 9 fig, 2 tab, 77 ref.

Descriptors: *Benthos, *Estuaries, *Biological communities, *North Carolina, Salinity, Temperature, Dissolved oxygen, Environmental effects, Brackish water, Limiting factors, Sediments, Water pollution effects, Dredging, Aquatic life, Distribution, Density, Seasonal, Dam construction.
Identifiers: *Macrobenthos, *Pamlico River (North Carolina), Rangia cuneata, Nereis succinea, Heteromastus filiformis, Heteromastus fragilis, Mulinia lateralis, Glycera dibranchia.

Pamlico River, North Carolina, can be described as an oligohaline-mesohaline system according to the Venice classification of brackish waters. Density, distribution, and community organization of the macrobenthos of this estuary were studied for a year. Measurements of salinity, temperature, dissolved oxygen, as well as particle size and concentrations of sediment organic matter were made. The sediment types were a sand substrate in the shallow area and a silty clay substrate in the deep area. Eighteen species of macrobenthos were found in preliminary sampling and the Shannon-Weaver information diversity index showed low values of 0.66-1.77. These indicated that stress of salinity conditions and unstable sediments are factors that make this estuary unfavorable for benthos. On the basis of trellis diagrams, the estuary was divided into three areas: an oligohaline zone dominated by Rangia cuneata and Nereis succinea; a mesohaline zone with a Macoma balthicaHeteromastus filiformis -Nereis succinea association; and a polyhaline zone at the mouth of the estuary characterized by a Macoma phenax-Mulinia lateralis-Glycera dibranchiata association. In the 1968-1969 sampling, thirty-six species were found. Changes in species composition showed significant seasonal cycles. (Jones-Wisconsin)
W72-11580

THE ECOLOGY AND PRODUCTION OF COPEPODS, PARTICULARLY THERMOCYCLOPS HYALINUS, IN THE TROPICAL LAKE GEORGE, UGANDA,

Royal Holloway Coll., Englefield Green (England). Dept. of Zoology.
M. J. Burgis.
Freshwater Biology, Vol. 1, p 169-192, 1971. 11 fig, 6 tab, 36 ref.

Descriptors: *Biological communities, *Copepods, *Tropical regions, *Life history studies, Ecological distribution, Animal populations, Lakes, Biomass, Standing crops, Zooplankton, Seasonal, Growth stages, Life cycles, Diurnal, Crustaceans.
Identifiers: *Thermocyclops hyalinus, *Lake George (Uganda).

Lake George, crossing the equator in Western Uganda, has stable environmental conditions. The population is mainly Thermocyclops hyalinus. Analysis of this population into the main development stages of its life history shows an almost constant age structure over the whole lake throughout the year. The development time of the Thermocyclops eggs is 1.5 days. This, plus mean development-times of 6 and 11 days for nauplii and copepodites respectively, has been used to determine the daily rate of recruitment from each life history stage to the next. The potential turnover time of population numbers was calculated to have a mean value of 4.2 days for the whole lake. With a constant population of stable age-structure the daily biomass production from the turnover time of numbers was estimated. Instantaneous birth rates, instantaneous rates of change in population numbers, and the instantaneous mortality rate have been calculated. The mean daily production level of Thermocyclops hyalinus in Lake George is among the higher values of zooplankton production available for comparison most of which are from temperate regions. (Jones-Wisconsin)
W72-11581

DISTRIBUTION OF EPILITHIC ALGAE ON THE UPPER REACHES OF YOSHII-GAWA RIVER: II. FURTHER ECOLOGICAL STUDIES OF EPILITHIC ALGAE IN THE KONGO-GAWA RIVER MITSUISHI-CHO, OKAYAMA PREFECTURE, (IN JAPANESE),

I. Imada.
Bull Jap Soc Phycol. Vol 19, No 2, p 56-64. 1971. Illus. Map. English summary.
Identifiers: *Algae, Bacillariophyceae, Chlorophyceae, Cyanophyceae, Distribution, Ecology, *Epilithic algae, Kongo-Gawa, Mitsuishi-Cho, Okayama, Oxygen, Prefecture, Reaches, Rivers, Temperature, Yoshii-Gawa, *Japan.

Cell numbers of epilithic algae were counted; water temperature, dissolved O2, KMnO4-consumption and pH were measured at 7 stations. The water temperature varied between 17.5 deg. C-18.5 deg. C, the dissolved oxygen, 3.61 ml/l - 10.74 ml/l, KMnO4-consumption, 29.54 mg/l - 46.11 mg/l, the pH, 7.1-7.2. The Bacillariophyceae were dominant at all stations, comprising about 78.9% of the total.

The maximum cell number of the Bacillariophyceae was 5300/mm2 and the minimum was 1450/mm2. The Cyanophyceae and the Chlorophyceae contributed 8.6-12.8% of the cell number. The maximum cell number of the Cyanophyceae was 1600/mm2. The maximum cell number of the Chlorophyceae was 500/mm2 and the minimum was 50/mm2.--Copyright 1972, Biological Abstracts, Inc.
W72-11588

THE ORIGIN OF DYSTROPHIC SWINGING BOGS IN AN ALKALINE LAKE: ECOLOGICAL-CENOLOGICAL STUDIES ON THE LAKE VELENCE (HUNGARY),
Eotvos Lorand Univ., Budapest (Hungary). Botanikus Kertje.
A. Borhidi, and M. Balogh.
Acta Bot Acad Sci Hung. Vol 16, No 1/2, p 13-31. 1970. Illus. English Summary.
Identifiers: Bolboschoenus-M, *Dystrophic bogs, Ecology, *Hungary, *Alkaline lake, Phragmites-M, Ruppia-M, Scirpus-M.

The reed-grass vegetation belongs to the Ruppietalia series in which several new communities may be differentiated. The alkaline reeds should be separated from the eutrophic-dystrophic Scirpo-Phragmitetum under the name Bolboschoeno-Phragmitetum. The alkaline water dystrophic so-called 'swinging bogs' are developing in the southwestern part of the lake. The separate ecosystem of these bogs forms by the productive activity of the reedy polycormic colony.--Copyright 1972, Biological Abstracts, Inc.
W72-11602

LIFE HISTORY AND BIOLOGY OF EINFELDIA SYNCHRONA (DIPTERA: CHIRONOMIDAE),
Department of Agriculture, Ottawa (Ontario).
H. V. Danks.
Can Entomol. Vol 103, No 11, p 1597-1606. 1971. Illus.
Identifiers: *Chironomidae, *Diptera, *Einfeldia-Synchrona, Larva, Photoperiod, Eutrophication.

Einfeldia synchrona Oliver is univoltine in a small, shallow, highly eutrophic pond near Ottawa (45 deg N.). Adult emergence is synchronized with slight protandry in May, and from this small pond exceeded 145,000 individuals in 1970. Emergence is inhibited experimentally at short photoperiods. More than 1 egg mass is produced, during a period of several days following emergence. First instar larvae, which lack ventral tubules, are at first pelagic but build cases before molting. The remaining 3 larval instars possess 1 pair of ventral tubules. Larvae show a preference for central areas of the pond over 40 cm deep, and show some mobility in response to seasonal depth changes. There are arrests in the development of larvae both in winter and during summer, with cessation of feeding, penetration into the mud, and construction in winter of special sealed cocoons. Marked year to year differences in the stage reached by winter, and in the larval population level, were detected. Many of these biological features are probably widespread in Chironomini and hence of some importance in the interpretation of studies of the bottom fauna.--Copyright 1972, Biological Abstracts, Inc.
W72-11682

MANMADE POLLUTION AND AMERICA'S 100,000 LAKES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
P. H. McGauhey, E. J. Middlebrooks, and D. B. Porcella.
Public Works, Vol. 103, No. 3, p 87-88, March 1972.

Descriptors: *Sewage treatment, *Efficiencies, *Eutrophication, *Lakes, *Water pollution effects, Reclaimed water, Sewage effluents, Research and development, Nutrients, Nitrogen, Phosphorus, Algae, Plant growth, Water pollution treatment, Evaluation, Water quality.
Identifiers: Fate of pollutants.

To combat the problem of pollution of our lakes, it has been advised that research be done to determine several factors in relation to sewage effluents and their effects on the eutrophication process: (1) the concentration at which nitrogen and phosphorus will trigger or support substantial algal growth, (2) the growth stimulating effect of sewage that has had its P and N partially removed, and (3) the ability of nutrient removal processes to reduce N and P to levels below that critical to algal growth. In addition, it is felt that since increasing populations tend to accelerate pollution in lake basins, the need for pollution research takes on other aspects: (1) the residual ability of tertiary sewage effluents to stimulate algal growth; (2) the ultimate fate of nutrients removed from sewage in a basin; and (3) the effect of man's near-shore and shoreline modifications on the beauty and biology of the system. Lake Tahoe is cited as an example of efficient wastewater reclamation and treatment. (Mackan-Battelle)
W72-11702

BACTERIOPLANKTON QUANTITY AND BIOMASS IN FLOOD LAKES OF THE AMUR RIVER,
Tikhookeanskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva i Okeanografii, Vladivostok (USSR).
I. A. Matarueva.
Gidrobiol Zh. Vol 7, No 3, p 25-30, 1971, English summary.
Identifiers: *Amur River, Biomass, Flood lakes, *Plankton, Quantity, USSR.

Microbiological examination of 9 Amur flood lakes shows that they are characterized by a high quantitative development of bacterioplankton.--Copyright 1972, Biological Abstracts, Inc.
W72-11718

OSCILLATORY VARIATION OF A PHYTOPLANKTON POPULATION IN A TROPICAL OCEAN,
McGill Univ., Montreal (Quebec). Marine Sciences Centre.
D. M. Steven, and R. Glombitza.
Nature, Vol 237, No 5350, p 105-107, May 12, 1972. 4 fig, 1 tab, 9 ref.

Descriptors: *Variability, *Phytoplankton, *Depth, On-site investigations, *Population, Temporal distribution, Chlorophyll, Sampling, Mathematical studies, Atlantic Ocean, *Tropical regions, Marine algae, Spatial distribution, Fourier analysis, Biorhythms, Correlation analysis, Primary productivity.
Identifiers: *Periodicity, Trichodesmium thiebaudii, Barbados.

Trichodesmium thiebaudii, a tropical phytoplankter, exhibited oscillatory variations in productivity while under observation in the tropical western Atlantic. Sixty-five collections were made at regular intervals (August 29, 1967-June 4, 1970) at an oceanographic station about 9 km west of Speightstown, Barbados, at a depth of 460 m. Chlorophyll concentrations were measured at 5, 25, 50, 75 and 100 m in 2 liter samples the numbers of phytoplankton were estimated at 5, 50, and 100 m in 0.5 liter samples of water fixed with one percent neutralized formalin. The number of filaments of Trichodesmium and other common phytoplankton were counted. Raw data indicate that chlorophyll concentrations and the number of filaments of Trichodesmium at 5 m fluctuated regularly with a periodicity of between 3 and 4 months. Other phytoplankton was usually less numerous and did not show such variation. The association between chlorophyll and the Trichodesmium was studied by harmonic analysis and by auto- and cross-correlations. It was shown that chlorophyll and Trichodesmium oscillate in phase with a periodicity of about 105-120 days. A similar analysis applied to the combined data from all depths to 100 m revealed chlorophyll concentration increases with depth. This increase is deemed to be associated with other organisms, not Trichodesmium. (Snyder-Battelle)
W72-11719

HETEROTROPHY BY PLANKTON IN THREE LAKES OF DIFFERENT PRODUCTIVITY,
Oak Ridge National Lab., Tenn. Ecological Sciences Div.
R. H. Monheimer.
Nature, Vol 236, No 5348, p 463-464, April 28, 1972. 2 fig, 1 tab, 10 ref.

Descriptors: *Plankton, *Lakes, Productivity, Phytoplankton, Organic compounds, Metabolism, Radioactivity techniques, Sulfur, Sulfates, Inorganic compounds, Photoperiodism, Tracers, Absorption, Least squares method, *Eutrophication, Oligotrophy, Mesotrophy, *Primary productivity, Statistical methods, Photosynthesis, Regression analysis.
Identifiers: *Heterotrophy, Limnetic zone, S-35, Sulfur radioisotopes, Membrane filters.

A radioactivity technique similar to the C-14 method of measuring primary productivity was used with a heterogenous mixture of dissolved S-35-labeled organic compounds instead of C-14-labeled ones in order to determine the rates of uptake of labelled materials by plankton in a eutrophic, mesotrophic, and an oligotrophic system. Such rates were measured by using 2.0 ml of the organic tracer/300 ml BOD bottle with the collected plankton and incubating the plankton in transparent and opaque bottles at 15 cm depth. At intervals of 1,2,4, and 6 hr, the contents of 4 clear and 4 opaque bottles were passed through 0.45 micrometer membrane filters, washed, dried, and counted for radioactivity. Data were fitted to a linear regression by the least squares method and the regression slopes compared by the t-test. Uptake rates of S-35-labelled inorganic sulfate were also determined. It was found that the inorganic isotope was taken up at a higher rate when the plankton was light incubated and that the organic tracer was accumulated faster by dark-incubated plankton. Two important conclusions were made: (1) Heterotrophic (dark) processes are important in total uptake of inorganic materials by plankton; and (2) Phytoplankton may conduct up to 50 percent of the heterotrophic activity occurring in the limnetic zone during the dark. (Mackan-Battelle)
W72-11720

DIURNAL PH PATTERNS AS PREDICTORS OF CARBON LIMITATION IN ALGAL GROWTH,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
L. G. Rich, J. F. Andrews, and T. M. Keinath.
Water and Sewage Works, Vol 119, No 5, p 126-130, May 1972. 5 fig, 1 tab, 12 ref.

Descriptors: *Hydrogen ion concentration, *Algae, *Growth rates, *Limiting factors, *Diurnal distribution, Carbon dioxide, Nitrogen, Phosphorus, Light, Nutrients, Mathematical studies, Equations, Aquatic environment, Water properties, Algal control, Water analysis, Chemcontrol, Water pollution effects, Water quality, Carbon.

A mathematical study of diurnal pH patterns is presented as they relate to algal growth limiting factors, whether they are carbon dioxide, nitrogen, phosphorus, or light. Such information might be of use in analyzing diurnal pH patterns in nature, thereby elucidating that particular factor controlling local algal growth. Data from computations conclude that fairly significant changes in pH magnitude in a diurnal period (of the order of several tenths of a pH unit) can occur only when CO2 is the limiting factor for at least a portion of the diurnal cycle. However, it must be remembered that tidal action and flow phenomena may also distort the pH patterns. (Mackan-Battelle)

W72-11724

TOXICITY OF MERCURY TO PHYTOPLANKTON,
New York Ocean Science Lab., Montauk.
R. Nuzzi.
Nature, Vol 237, No 5349, p 38-39, May 5, 1972. 3 fig.

Descriptors: *Phytoplankton, *Mercury, *Toxicity, Cultures, *Chlorella, Aquatic algae, Chlorophyta, Heavy metals, *Chlamydomonas, Inhibitors, *Lethal limit, Water pollution effects, Water pollution sources, Inhibition.
Identifiers: Phaeodactylum tricornutum, Phenylmercuric acetate, Mercury chloride, Phenylacetate, Mercury compounds.

Experiments were performed to determine the toxicity of mercury to three phytoplankton species at concentrations as low as 0.06 micrograms/liter. Phaeodactylum tricornutum, Chlorella sp., and Chlamydomonas sp. were grown and tested axenically in chemically defined media. Each was inoculated into two series of tubes containing HgC12 at concentrations ranging from 0.74-66.6 micrograms Hg/liter and phenylmercuric acetate (PMA) concentrations ranging from 0.66-15.0 micrograms Hg/liter. P. tricornutum was also tested against phenylacetate concentrations equivalent to the phenylacetate concentration in the PMA series of tubes. Cells were counted after 16 days incubation at 18 C and it was found that all the organisms had been inhibited by the mercury compounds. PMA was more toxic than mercury chloride, causing inhibition at concentrations as low as 0.06 micrograms Hg per liter. The inhibition of P. tricornutum by PMA at 3 micrograms Hg/l was almost completely reversed by the addition of 5 percent glutathione. Cells grown at sublethal concentrations showed increased incidence of morphological abnormalities with an increase in mercury content. (Snyder-Battelle)
W72-11727

ACCUMULATION OF CS-137 BY AEDED AEGYPTI LARVAE AND THE EFFECT OF POTASSIUM CONCENTRATION,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
J. E. Guthrie, and A. Z. Burzynski.
The Canadian Entomologist, Vol. 104, No. 3, p 411-416, March 1972. 3 fig, 14 ref.

Descriptors: *Bioassay, *Larvae, Larval growth stage, Mosquitoes, *Cesium, Radioactivity effects, Radiochemical analysis, Potassium, Radioactivity techniques, Water pollution effects.
Identifiers: *Cs-137, *Bioaccumulation, *Excretion, Aedes aegypti, Cesium radioisotopes, Chemical interference, Sample preparation.

Experiments have been conducted to study radioactive cesium accumulation by Aedes aegypti larvae and its subsequent elimination by the adults. Instar I larvae were hatched from eggs and reared at 20 and 25 degrees Centrigrade. The experimental groups were fed labeled, ground dog meal and samples of 6 larvae were taken every hour for the first 6 hours, at 24 hr, 30 hr, and daily thereafter until pupation. To determine the biological half-lives of Cs-137 elimination, the larvae were reared at 20 C and instar IV larvae transferred to distilled water to pupate. Sample preparation involved drying the specimens overnight over calcium chloride, weighing, and fastening to stainless steel planchets with a 1:10 solution of collodion in acetone. Total beta counting was used to measure the amount of radioactive cesium. Radiocesium accumulation was greater at 25 C, that at 20 C. The activity density (c.p.m./mg dry wt.) of the adults was the same for both sexes, as was the nuclide's elimination rate. The amount of Cs-137 accumulated by the larval instars was inversely proportional to the concentration of potassium in the rearing medium, the suppression of Cs-137 uptake being greater at 25 C than at 20 C. The possibility that larvae may accumulate Cs-137 via the anal papillae and the gut, is briefly discussed. (Synder-Battelle)
W72-11737

5D. Waste Treatment Processes

A FLUSHING SYSTEM FOR COMBINED SEWER CLEANSING.
FMC Corp., Santa Clara, Calif. Central Engineering Labs.

Copy available from GPO Sup Doc as EP2.10:11020, $1.75; microfiche from NTIS as PB-210 858, $0.95. Environmental Protection Agency, Water Pollution Control Research Series No. 11020 DNO, March 1972. 233 p, 30 fig, 25 tab, 7 ref. EPA Program 11020 DNO 03/72.

Descriptors: *Storm drains, *Cleaning, *Flow rates, Separated sewers, *Sewers, On-site investigations, Mathematical models, Storage, Suspended solids, Design criteria, Cost analysis, Water quality control, Waste water treatment.
Identifiers: *Flush waves, *Combined sewers, *Flushing systems.

Full-scale tests were conducted on two variable-slope test sewers (12- and 18- inch diameters), during which solids were first allowed to build up by passing domestic sewage through the sewers for durations of 12 to 40 hours and then were removed by hydraulic flushing. Test results demonstrated that flush waves generated using flush volumes ranging from 300 to 900 gallons at average release rates ranging from 200 to 3000 gpm removed from 20 to 90 percent of the solids deposited in the 800-foot long test sewers. Formulas were developed which gave satisfactory predictions of several cleansing efficiencies and wave depths for the flush waves and sewer sizes studied. Percent removal was shown to be a function of: flush volume; flush discharge rate; sewer slope; sewer length; sewage flow rate; and sewer diameter. A prototype flush station developed in this project can be inserted in a manhole to provide the functions necessary to pick up sewage from the sewer, store it in a coated fabric tank, and release the stored sewage as a flush wave upon receipt of an external signal. An estimate of costs of periodically flushing combined sewer laterals indicated a range of costs from $630 per acre to $1,275 per acre for average removal efficiencies of 61 percent and 72 percent, respectively. (Lowry-Texas)
W72-11089

FLUIDIC VORTEX BUBBLE GENERATOR.
Bowles Fluidics Corp., Silver Spring, Md.

Copy available from GPO Sup Doc as EP2.10:17030, $1.00; microfiche from NTIS as PB-210 808, $0.95. Environmental Protection Agency, Water Pollution Control Research Series No. 17030 FEB, February 1972. 75 p, 40 fig, 5 tab, 48 ref. EPA Program 17030 FEB 02/72.

Descriptors: *Flotation, *Bubbles, *Separation techniques, Laboratory tests, Flow rates, *Aeration, Effervescence, Baffles, Pressure, Design criteria, Operation and maintenance, *Waste water treatment, Water pollution control.
Identifiers: *Aspiration.

An engineering investigation and evaluation of vortex devices as bubble makers for use in the removal of suspended solids from wastewaters was conducted. Specific objectives included the development and test of bubble makers capable of generating bubbles having mean diameters of about 100 microns with vortex devices having minimum liquid passageways of 1/4 inch or greater. Bubbles having a mean diameter of 80 to 85 microns, with virtually no bubbles greater than 130 microns, were successfully produced. This mean size and size range are substantially the same as bubbles produced by pressurized water processes at similar operating pressures. Bubbles were produced both by aspirating atmospheric air directly into the vortex unit, and by aspirating atmospheric air at the suction side of the pump, dissolving it, and precipitating it or effervescing it at the vortex unit. The best vortex device tested produced bubbles at roughly one-sixth to one-seventh the rate per horsepower of comparable pressurized water equipment. Indications are, however, that this margin may be reduced by increasing vortex gain, and by aspirating air to the so-called outside of the vortex exit cone as well as the inside. Flotation testing was not successfully accomplished with any device or system during this investigation, due to test fixture problems. Sufficient data now exist, however, to design vortex systems for direct functional tests in conventional air flotation systems. (Lowry-Texas)
W72-11090

TREATMENT OF PARAMAGNETIC SLURRIES FROM STEEL MILL OPERATIONS BY DOUBLE FLOCCING,
Dravo Corp., Pittsburgh, Pa.
D. F. Peck, and T. J. McBride.
Iron and Steel Engineer, Vol 46, No 10, October 1969, p 79-83. 11 fig.

Descriptors: *Industrial wastes, *Mineral industry, *Flocculation, Suspended solids, Polymers, Separation techniques, Iron compounds, Color, Filtration, Sludge, Cost analysis, *Waste water treatment.
Identifiers: *Magnetic flocculation.

Field studies of the use of polymer flocculants with magnetic exposure for paramagnetic slurries have produced settling rates higher than for any other treatment or conditioning known for similar wastes. Advantages of such a system include: (1) smaller land and construction requirements; (2) possibility for use in correcting existing overloaded treatment facilities; (3) a reduction of polymer requirements over conventional flocculation alone; (4) a permanent magnetic backup should the polymer system fail; (5) a high degree of suspended solids and apparent color removal; and (6) improved sludge handling characteristics from the standpoint of tenaciousness and dewatering properties. However, for highly colored wastes requiring high quality discharges, a tertiary deep bed filter is recommended for final effluent polishing. (Lowry-Texas)
W72-11091

AERATED LAGOONS TREAT MINNESOTA TOWN'S WASTES,
Hinde Engineering Co., Highland Park, Ill.
J. B. Neighbor.
Civil Engineering, Vol 40, December 1970, p 59-61. 3 fig, 1 tab.

Descriptors: *Aerated lagoons, *Industrial wastes, *Municipal wastes, *Cost analysis, Construction costs, Operating costs, Dairy industry, Food processing industry, Bubbles, Mixing, Aeration, Sludge disposal, Mass transfer, Performance, Biochemical oxygen demand, *Waste water treatment, *Minnesota.
Identifiers: *Winsted (Minn), *Dairy processing wastes.

A multiple-cell aerated lagoon system was designed and constructed to treat municipal wastes from the town of Winsted, Minnesota, wastes from a small creamery, and washwaters from Minnesota's largest cheese producer. Three lagoons in series, equipped with difused air aeration, now handle 311,000 gpd of influent containing 3600 lbs BOD5. All three lagoons measure 120 ft. wide by 1070 ft. long by 10 ft. deep, with a combined holding capacity of 12,397,000 gallons and a total retention time of 46 1/2 days. During the past 2 years, removal of BOD has averaged 93 to 99% and removal of volatile dissolved solids has averaged 80 to 98%. Construction costs were only $224,000, as compared to $485,000 estimated for a

contact stabilization plant. Operating costs were $7000/yr as compared to $17,000/yr for the conventional plant. The lagoon system also produces no sludge handling problems and provides a consistently high degree of treatment to a widely varying waste. (Lowry-Texas)
W72-11092

EFFECTS OF SUSPENDED SOLIDS CONCENTRATIONS ON THE STRUCTURE OF TURBULENCE AND THE OXYGEN TRANSFER MECHANISM IN ACTIVATED SLUDGE,
Tokyo Univ. (Japan). Dept. of Urban and Sanitary Engineering.
T. Matsuo.
Preprint, presented at 6th International Water Pollution Research Conference, Session 8, Paper No 15, June 21, 1972. 14 p, 10 fig, 8 tab, 13 ref.

Descriptors: *Turbulence, *Mass transfer, *Oxygenation, Reaeration, *Activated sludge, Aeration, Bubbles, Suspended solids, Particle size, Sludge, Mixing, Biodegradation, Instrumentation, Laboratory tests, *Waste water treatment.
Identifiers: *Oxygen uptake rate.

A laboratory scale aeration tank of 35 liter capacity was used to determine the types of flow regions obtained in activated sludge systems, and to determine the effects of bubble size and suspended solids concentration both on the turbulence regime and the oxygen transfer characteristics. Initial results demonstrated that turbulence which is affected by suspended solids is in the 'micro-scale,' comparable to the size of the solids, and effects of suspended solids on 'macro-turbulence' patterns were not distinctly identified. However, further investigations demonstrated that the scale of turbulence having a direct effect upon 'KLa' or the oxygen uptake rate is also the 'micro-scale'. Because of the limitation of the measuring instruments, however, complete quantitative analysis of turbulence is not yet possible, but the shape, size, or concentration of suspended solids may be considered in obtaining a qualitative measure in order to characterize the structure of turbulence. For these reasons, in further testing, the concentration of suspended solids as well as the intensity of mixing must be accounted for to maintain biologically similar conditions. (Lowry-Texas)
W72-11095

THE DEVELOPMENT AND EFFECT OF CONSTRUCTION AND OPERATION COST IN BIOLOGICAL SEWAGE TREATMENT PLANTS,
Baubehorde (West Germany). Hauptabteilung Stadtenwasserung.
E. Sickert.
Preprint, presented at 6th International Water Pollution Research Conference, Session 7, Paper No 13, June 21, 1972. 15 p, 10 fig, 7 ref.

Descriptors: *Waste water treatment, *Municipal wastes, *Cost analysis, Construction costs, Operating costs, Operation and maintenance, Electric power costs, Instrumentation, Equipment, Automation, Optimization, *Sewage treatment, *Biological treatment.

The cost of wages in the wastewater treatment industry has risen 100% and cost of construction has risen 65% in the last ten years alone. One of the responsibilities of running a wastewater treatment plant is to keep both initial and operational costs to a minimum. First, larger plants cost less to build per unit of available capacity, and also cost less to operate, indicating centralization of facilities as a logical cost saving step. However, shared centralized facilities and manpower by many plants in a certain district can also realize cost savings. In addition, since power cost has been nearly stable and is predicted to continue similarly, replacement of labor by automation is another logical measure. By pointing out these measures and assigning a weight to their influence an even higher economy may be achieved. Although the list is far from complete, there are many fundamental possibilities of improvement which can benefit from previous experience and judgement. (Lowry-Texas)
W72-11096

CARPET MILL INDUSTRIAL WASTE SYSTEM,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
R. Stone.
Journal Water Pollution Control Federation, Vol 44, No 3, March 1972, p 470-478. 6 fig, 4 tab.

Descriptors: *Textiles, *Industrial wastes, *Dyes, Flow control, Storage, Construction costs, Operating costs, Cost analysis, *Waste water treatment, *California.
Identifiers: *Industry (Calif).

The Walter Carpet Mill in the City of Industry, California, includes an integrated tufting plant, dye house, warehouse, sales-showroom, and management offices. Plant industrial wastes are generated by steam boiler blowdown, the zeolite softeners and their sodium chloride regenerate, cooling tower blowdown facility and equipment cleanup, and dye works effluent. Sanitary wastes are segregated and discharged to the public sewer. A surge reservoir with a 200,000 gallon capacity and two dye beck basins with a total storage capacity of 85,000 gallons were constructed to store the wastes produced daily for automatic metering into the public sewer during the low flow night-time conditions. Concrete tilt-up panels were used for treatment basin construction, and a 0.5 inch thick flexible asphalt membrane was used in the surge reservoir. Total construction costs were $125,000, with operating costs including 20 year amortization at 7 1/2% interest averaging $25/day. Total unit cost was $0.025/1000 gallons. (Lowry-Texas)
W72-11097

ACTIVATED SLUDGE SYSTEM-CONTROL AND ANALYSIS,
Decatur Sanitary District, Ill.
J. F. Reynolds.
Water and Sewage Works, Vol 117, No 7, July 1970, p 251-259. 7 fig, 2 tab, 3 ref.

Descriptors: *Waste water treatment, *Municipal wastes, *Activated sludge, Oxygen requirements, Aeration, Mechanical equipment, Treatment facilities, Performance, Illinois.
Identifiers: Oxygen transfer, Decatur (Illinois), Oxygen uptake rates, Alpha factor, Spiral row aeration, Cross row aeration, Sparger diffusers.

System modification and control and analysis methods utilized by the Decatur, Illinois activated sludge system were presented. The stabilization section of the system was reduced from a detention time of 14 hr and a total capacity of 169,000 cu. ft. to a detention time of 5 hr and a total capacity of 56,000 cu. ft. The 113,000 cu. ft. of tankage obtained was placed in operation as additional aeration tanks. Also, the spiral roll aeration pattern was changed to a cross row aeration pattern and the number of sparger diffuser units was increased. The cross row system thus installed increased the capacity of oxygen transfer an additional 60 percent. Determinations of oxygen uptake rates, alpha factors and oxygen transfer efficiencies have been added to the control and analysis methods. The mean values of alpha, for the years 1965-69, for the primary effluent was 0.419 and the mean value for alpha in the final effluent was 0.857. Yearly averages of operating parameters for the years 1965-69 were presented. (Galwardi-Texas)
W72-11099

A SYMBIOTIC SYSTEM FOR ADVANCED TREATMENT OF WASTEWATER,
Ohio State Univ., Columbus. Dept. of Civil Engineering.
F. J. Humenik, and G. P. Hanna, Jr.
Water and Sewage Works, Vol 117, No 6, June 1970, p 198-202. 6 fig, 11 ref.

Descriptors: *Waste water treatment, *Nutrients, *Algae, *Bacteria, *Symbiosis, Activated sludge, Nitrogen, Phosphorus, Chemical oxygen demand, Chlorella, Performance, Efficiencies, Laboratory tests, Laboratory equipment, Aeration, Dissolved oxygen, Aerobic conditions, Biomass, Respiration, Photosynthetic oxygen, *Tertiary treatment.
Identifiers: Organic nitrogen, Settling characteristics, Solids recycle, Solids control.

Under controlled environmental conditions a symbiotic algal-bacterial culture was developed and maintained which would efficiently remove nutrients from wastewater. The culture of the biomass growth system was a natural mixture of algae, predominantly Chlorella, and activated sludge in which the algae became enmeshed within the bacterial matrix. The algal-bacterial floc exhibited good settling characteristics under quiescent conditions. Maximum and most consistent removal of influent COD and organic nitrogen was obtained during unaerated operation with solids control and through daily harvest of excess biomass. COD removal for the reclarified supernatant averaged 82.5 percent with 88.2 percent as the maximum. Organic nitrogen removal averaged 85.3 percent. However, no appreciable removal of phosphorus was recorded. The symbiotic algal-bacterial system remained aerobic during unaerated periods as a result of a balance between respiration and photosynthetic oxygenation. An average value of 2 mg/l dissolved oxygen was reported. Supplemental aeration did not result in increased nutrient removal, and was therefore considered as a wasted energy input. (Galwardi-Texas)
W72-11100

CHARACTERISTICS OF YEASTS ISOLATED FROM PHENOL- AND CATECHOL-ADAPTED ACTIVATED SLUDGES,
Indian Inst. of Science, Bangalore.
B. V. Rao, and J. V. Bhat.
Antonie Leeuwenhoek J Microbiol Serol. Vol 37, No 3, p 303-312. 1971. Illus.
Identifiers: Activated sludges, Candida tropicalis, Catechols, Phenols, Sludges, Trichosporon cutaneum, *Yeasts, *Waste water treatment, Separation techniques.

Phenol- and catechol-adapted sludges contained large numbers of the yeasts, Candida tropicalis and Trichosporon cutaneum. Both were able to grow on a variety of aromatic compounds and utilized phenol and catechol at a high rate. This property was inducible. The feasibility of using these yeasts for removing phenols from waste waters is suggested.--Copyright 1972, Biological Abstracts, Inc.
W72-11102

ACCELERATED DIGESTION OF CONCENTRATED SLUDGE,
Mississippi State Univ., State College. Dept. of Sanitary Engineering.
A. Shindala, J. V. Dust, and A. L. Champion.
Water and Sewage Works, Vol 117, No 9, September 1970, p 329-332. 2 fig, 4 tab, 16 ref.

Descriptors: *Anaerobic digestion, *Sludge treatment, *Domestic wastes, Alkalinity, Hydrogen ion concentration, Efficiencies, Performance, *Waste water treatment.
Identifiers: Solids concentration, Volatile acids, Gas production, Loading rate, Volatile matter reduction.

A laboratory study was conducted to determine the effect of concentration of sludge on the anaerobic digestion of a domestic sludge. Sludge concentrations of 5, 15, 25, and 35 percent were used and a digestion temperature of 92 to 95F was maintained. Loading periods of 10, 15, 20, and 30 days were used. Gas production of all digesters was recorded and changes in pH, alkalinity, volatile acids, and reduction in volatile matter added to the digesters was observed every four days. Results showed that solids concentration

had a definite effect upon digestion as the percent reduction in volatile matter decreased with increased solids concentration for all loadings. Also, the volatile acids and alkalinity in general increased with the increase in solids concentration, however, the pH remained nearly constant. The maximum amount of gas per liter of sludge was produced at the 15 percent solids level while the 5 percent solids level produced the most gas per unit of dry solids. Loadings of concentrated sludges up to 10 mg/l per day produced an acceptable volatile solids reduction. (Galwardi-Texas)
W72-11104

SOLVENT EXTRACTION OF MERCURY FROM BRINE SOLUTIONS WITH HIGH--MOLECULAR-WEIGHT AMINES,
Oak Ridge National Lab., Tenn.
F. L. Moore.
Environmental Science and Technology, Vol 6, No 6, June 1972, p 525-529. 1 fig, 8 tab, 4 ref.

Descriptors: *Pollution abatement, *Mercury, *Solvent extractions, Solvents, Brines, Performance, Laboratory tests, Metals, Ions, Separation techniques, Copper, Cadmium, Zinc, Lead, *Waste water treatment.
Identifiers: High-molecular-weight amines, Quaternary amines, Regeneration, Nitric acid, Ethylenediamine, Propylenediamine, Aluminum, Reduction-precipitation, Industrial recovery, Arsenic.

The use of high-molecular-weight amines for the removal of mercury from brine solutions and other aqueous chloride solutions was investigated using solvent extraction techniques. Mercury was extracted at both the subnanogram and macro levels. Especially attractive were the commercially available quaternary amines, Aliquat 336 and Adogen 464, because of their ability to extract mercury from alkaline as well as acidic brine solutions. Regeneration of the amine solvent was readily achieved by stripping the mercury with aqueous solutions of nitric acid, ethylenediamine, or propylenediamine. Alternatively, the mercury can be stripped directly from the solvent by aluminum reduction-precipitation. A simple process was described for the abatement of mercury pollution in industrial brines and hydrochloric acid solutions. In addition to mercury the process was found to extract a number of other toxic metal ions: Cadmium, zinc, lead, arsenic and copper. (Galwardi-Texas)
W72-11107

INDUSTRIAL MANAGEMENTS' CONCERN,
General Motors Corp., Detroit, Mich.
W. A. Kemmer.
Waste Age, April 1970, p 26-28.

Descriptors: *Solid wastes, *Industrial production, *Salvage value, Natural resources, Management, Cost comparisons, Political aspects, Pollution abatement, Public health, Government supports.
Identifiers: *Reuse, Michigan State Chamber of Commerce.

There are several strong incentives for all of business to be concerned about and for it to contribute to the development and implementation of good solid waste management. The forces of competition require prudent business management to look continually for ways to reduce or eliminate waste. It is in the best interests of business and industry to conserve natural resources. Reclaiming or reprocessing of scrap for reuse is a demanding business. Moreover, when disposal of waste materials is necessary, it must be done in such a manner as to protect the quality of our environment. The Michigan State Chamber of Commerce recently released a policy statement on solid waste management which contains three key concepts. Solid waste management cannot be low cost without a minimum duplication of facilities and maximum of competition. Any determination of capacity and area served must be made by economic competition and not on the basis of political subdivisions. Solid waste management cannot be low cost without maximum salvaging and recycling. Control of the process so that the salvaged material meets the specification required for reuse must be included as part of the whole process. Finally, government's role in this endeavor should be that of protector of public health. However, government's role should not extend to the use of public funds for the operation of an enterprise requiring large capital investments, continuing research and development and marketing of end products. (Galwardi-Texas)
W72-11108

LIQUID WASTE DISPOSAL FROM A SLAUGHTER HOUSE,
Dutterer's of Manchester, Md.
E. S. Hopkins, and G. M. Dutterer.
Water and Sewage Works, Vol 117, No. 7, July-August 1970, p IW/2-IW/3, 1 fig, 1 tab.

Descriptors: *Industrial wastes, *Waste water treatment, *Treatment facilities, *Equipment, Performance, Biochemical oxygen demand, Hydrogen ion concentration, Oxidation lagoons, Flotation, Suspended solids, *Waste water disposal.
Identifiers: *Slaughter house wastes, Grease removal, Mechanical surface aeration, Equalization tank, Alum, Chemical treatment.

An automated 30,000 gallon per day, wastewater treatment plant was designed for a slaughter house waste. Analysis of the waste disclosed a BOD5 of 1700 mg/l; suspended solids, 1090 mg/l; grease, 90 mg/l and a pH value of 6.6. A flow diagram of the plant was presented along with the names and capacity of the units utilized. The processes included an equalization tank, vibration screen for solids removal, solid grease removal, chemical addition and mixing, grease flotation unit, holding tank, oxidation basin and chlorine contact tank. Alum was used to break a water-fat emulsion. The plant has operated on an average discharge of about 23,500 gpd using an alum dosage of 26 mg/l. The average characteristics of the effluent were: pH of 6.4; dissolved oxygen, 8.1 mg/l; BOD5, 10.1 mg/l; free residual chlorine, 0.3 mg/l; and coliform organisms, 220 per 100 ml. The oxidation basin motors were energized by an interval time clock and all probe controlled equipment was operated by fixed water levels in the tanks. (Galwardi-Texas)
W72-11109

STORM-WATER RETENTION CAN WORK,
Detroit Metro Water Dept., Mich.
G. Remus.
The American City, Vol 85, No. 10, October 1970, p 68-69, 2 fig.

Descriptors: *Storm runoff, *Pollution abatement, *Sewers, Water pollution, *Monitoring, Remote sensing, Remote control, Rain gauges, Sewage treatment, Storage capacity, Computers, Flowmeters, Flow measurement, Flow control, *Michigan.
Identifiers: *Combined sewers, Interceptor sewers, *Detroit (Mich).

The Detroit Metro Water Department has installed a monitoring system that allows it to apply such pollution control techniques as storm flow anticipation, first flush interception, and selective overflowing. The system helps prevent massive storm water pollution of the Detroit and Rouge Rivers by allowing for storage of storm-water in the sewer system and subsequent treatment. During a 0.47 inch rainfall over the Detroit area approximately 450 million gallons entered the sewer system and the sewage treatment plant processed about 365 million gallons in excess of average flow during the following 30 hours. The $2.1 million project included 14 telemetering tipping bucket rain gauges, 80 Meta-Meter telemeter sewer-level gauges in combined sewers and 40 Meta-Meter telemeter gauges located in interceptor sewers. The sensors were connected to a central computer, datalogger and operating console that activate seven pumping stations and three sluice gates. (Galwardi-Texas)
W72-11110

WASTEWATER TREATMENT WITH POWDERED ACTIVATED CARBON REGENERATED BY WET AIR OXIDATION,
Zimpro, Inc., Rothschild, Wis.
P. V. Knopp, and W. B. Gitchel.
Proceedings, Industrial Waste Conference, 25th, May 7-9, 1970, p 687-698, 8 fig, 6 tab, 9 ref.

Descriptors: *Waste water treatment, *Activated carbon, *Municipal wastes, Performance, Efficiencies, Chemical oxygen demand, Temperature, Pressure, *Oxidation, Heat exchangers, Cost comparisons, Activated sludge, Installation costs, Operating costs.
Identifiers: *Powdered activated carbon, Regeneration, Primary sewage, Wet oxidation.

The use of powdered activated carbon for removing soluble organics from wastewater has been limited by the need for an economic and effective regeneration system. Results showed that partial wet air oxidation can effectively restore the adsorptive properties of powdered activated carbon without dewatering of the slurry. Spent powered activated carbon from a two stage counter-current contact system treating primary effluent sewage was successfully regenerated. The spent carbon slurry at approximately 6 to 8 percent solids was pumped along with air through a heat exchanger to a reactor designed to operate at a preselected temperature and pressure. Under these conditions the sorbed organics were selectively burned off the carbon. The regenerated carbon was returned through the heat exchanger, releasing its heat to the incoming slurry, and was conveyed to a storage tank. After 22 regenerations of the carbon there was no apparent diminution in the performance of the carbon. The system was operated with a 4.7 percent carbon makeup rate. Product water produced at carbon loading of .34 g COD adsorbed per g carbon was less than 20 mg/l. Total annual costs were estimated for 1, 10 and 100 MGD capacity at 28.5, 13.2 and 12.1 cents per thousand gal. treated which are approximately equivalent to conventional activated sludge treatment costs. (Galwardi-Texas)
W72-11111

FIELD STUDIES OF ARTIFICIAL AERATION USING A DOWNFLOW TUBE CONTACTOR,
Tufts Univ., Medford, Mass.
For primary bibliographic entry see Field 05G.
W72-11112

AERATED LAGOON TREATMENT OF WASTES FROM THE DOW CHEMICAL COMPANY, ZIONSVILLE, INDIANA,
Dow Chemical Co., Zionsville, Ind.
G. W. Mann.
Proceedings, Industrial Waste Conference, 25th, May 7-9, 1970, p 543-550, 8 fig, 1 tab.

Descriptors: *Oxidation lagoons, *Industrial wastes, *Chemical wastes, Performance, Aeration, Equipment, Freezing, Weather, Biochemical oxygen demand, Chemical oxygen demand, Chlorination, *Indiana, *Wastewater treatment.
Identifiers: Dow Chemical Company, *Zionsville (Ind), Capacity, Problems, Surface aerators. Compressed air.

In 1963, Dow Chemical Company constructed a 7 million gallong capacity aerated lagoon for the treatment of wastes from its Zionsville, Indiana plant. The aerated lagoon was designed with an average depth of 5 ft. to receive 160,000 gpd of waste which would have a detention time of 45 to 50 days. Aeration was provided by four 10 hp air

compressors through 25,000 linear ft. of slotted 0.5 in. tubing positioned across the lagoon. Plugging of the plastic tubing and freezing conditioners presented problems in 1964-65 and the winter of 1965. The aeration problem was solved with the installation of 8 floating aerators during the period from March 1966 to June 1967. Each aerator was a 5 hp, impeller type unit with a pumping rate of 2,000 gpm and a circulation radius of 250 ft. Chlorination of the effluent was required in late 1967. The lagoon again froze over in the winter of 1967. No serious problems occurred during the last nine months of 1968 and an acceptable effluent was achieved. (Galwardi-Texas)
W72-11113

OPERATING CHARACTERISTICS OF STRONG-BASE ANION EXCHANGE REACTORS,
New Mexico State Univ., University Park.
W. S. Midkiff, and W. J. Weber, Jr.
Proceedings, Industrial Waste Conference, 25th, May 7-9, 1970, p 593-604, 12 fig, 1 tab, 7 ref.

Descriptors: *Ion exchange, *Nitrates, *Phosphates, Pollution abatement, Selectivity, Flow rates, Length, Performance, Efficiencies, Laboratory tests, Resins, Bicarbonates, Sulfates, *Waste water treatment.
Identifiers: Hydraulic loading, Bed depth, Reverse exchange, Reaction zone, Dowex 21K, Anion resin.

The ion exchange reactions between a strongly basic highly reactive, anion resin, Dowex 21K, and aqueous solution of 3 x 10-3 M HCO-3, 1 x 10-3 M SO4 2-, 2.5 x 10-4 M HPO4 2- and 5 x 10-4 M NO3- were investigated in continuous flow columnar contacting systems. For the polyatomic anions studied, selectivity was found to be proportional to charge but inversely proportional to ionic radius that is, SO4 2-> HPO4 2-> NO3-> HCO3-. Results from hydraulic loading studies indicated that no significant difference in the breakthrough profiles can be attributed to changing flow rate in the range between 6.5 gpm/sq. ft. and 59 gpm/sq. ft. The effect of bed depth on ion exchange performance was also studied. Bed depths of 7, 14, 28, 56, and 84 cm were used. When the length of the column was less than the length of the reaction zone, leakage was immediate. The length of the reaction zone was defined as the region between five percent and 95 percent breakthrough. In very shallow resin beds, the phenomenon of reverse exchange increased in magnitude with increasing bed depth. Both reverse exchange and length of reaction zone appeared to stabilize in bed depths in excess of 75 cm. The depth of the resin bed, not the contact time, determined the efficiency of operation. The deeper the bed, the smaller the percentage occupied by the reaction zone, and the higher the percentage of the bed available for complete exhaustion prior to initiation of breakthrough. (Galwardi-Texas)
W72-11114

CONTINUOUS BREAKING OF EMULSIONS BY COALESCENCE ON SUPPORTED LIQUID FILMS,
Case Western Reserve Univ., Cleveland, Ohio. Div. of Chemical Engineering Science.
R. E. Sparks, and I. D. Stafford.
Proceedings, Industrial Waste Conference, 25th, May 7-9, 1970, p 745-756, 8 fig, 3 tab, 41 ref.

Descriptors: *Industrial wastes, *Emulsions, *Coalescence, Thin films, Laboratory tests, Test procedures, Performances, Flow rates, Materials, Viscosity, Wetting, Wettability, Viscous flow, *Wastes water treatment.
Identifiers: *Polyethylene cubes, Continuous operation, Roughness, Hexane, Glycol, Glycerine, Field studies.

An effective process for the continuous breaking of emulsions by coalescence on supported liquid films was developed. Rough sawed polethylene pieces approximately 1/4 in x 1/4 in x 1/2 in were found to give the best results. Wetting angles of smooth surfaces and liquid-liquid-solid contact angles for various substances and materials were reported. The effect of roughness of the material surface was investigated. For polyethylene, it was apparent that a 30 to 50 micron roughness was sufficient to obtain the desired effect. Some of the emulsions tested were: hexane in glycol, Bright Stock in water, and hexane in 81 percent glycerine. A LARGE SCALE TEST OF THE TECHNIQUE WAS SUCCESSFULLY CONDUCTED. The task involved removing a few percent of a low molecular weight organic material from a viscous aqueous stream. Polyethylene cubes were used on a 40,000 gal/day stream, operating at a fluid velocity of 0.5 cm/sec. Major advantages and some difficulties associated with the process were outlined. (Galwardi-Texas)
W72-11115

RECLAMATION AND WATER MANAGEMENT (MELIORATSIYA I VODNOYE KHOZYAYSTVO).
Ministerstvo Melioratsii i Vodnogo Khozyaistva Ukrainskoi, Kiev (USSR).

Melioratsiya i Vodnoye Khozyaystvo, No 17, Izdatel'stvo 'Urozhay', Alpat'yev, S. M., editor, Kiev, 1971. 172 p.

Descriptors: *Land reclamation, *Water management (Applied), *Hydraulic engineering, Hydraulics, Hydraulic design, Irrigation, Irrigation systems, Drainage, Drainage systems, Hydrogeology, Economics, Soils, Soil properties, Groundwater, Fertilizers, Crops, Crop production, Analytical techniques, Instrumentation, Computers.
Identifiers: USSR, *Ukraine, *Agrochemistry, Sod-Podzolic soils, Superphosphates, Top-dressing, Pot tests.

This collection contains 22 papers dealing with various aspects of irrigation, drainage, hydrogeology, hydraulic engineering, and economics of water projects in the Ukrainian SSR. Specific topics include: (1) irrigation with waste waters and fertilizers and their effect on quality of winter wheat; (2) sprinkler irrigation in areas with steep slopes; (3) drainage and its effect on oxidizing-reducing regime of soil of rice fields; (4) changes in properties of wet and excessively wet soils; (5) vapor diffusion in dessicated soils; (6) changes in nitrogen regime of Peat soil as a function of groundwater depth; (7) effectiveness of land reclamation and crop cultivation on saline calcareous Peat soils; (8) maximum water discharges in drained areas; (9) use of computers to calculate water distribution; (10) hydraulics of porous pipes; (11) flume designs for irrigation systems; and (12) techniques and instruments for determination of infiltration losses. (See W72-11121 thru W72-11126) (Josefson-USGS)
W72-11120

EFFECTS OF FERTILIZERS AND WASTE WATERS OF THE BORTNICHI IRRIGATION SYSTEM ON QUALITY OF WINTER WHEAT (VLIYANIYE UDOBRENIY I STOCHNYKH VOD BORTNICHSKOY OROSITEL'NOY SISTEMY NA KACHESTVO ZERNA OZIMOY PSHENITSY),
Ukrainskii Nauchno-Issledovatelskii Institut Fisiologii Rastenii, Kiev (USSR).
M. V. Kozinets, and O. P. Opanasenko.
In: Melioratsiya i Vodnoye Khozyaystvo, No 17, p 3-9, Izdatel'stvo 'Urozhay', Kiev, 1971. 3 tab, 4 ref.

Descriptors: *Return flow, *Fertilizers, *Wheat, *Grains (Crops), *Irrigation systems, Sprinkler irrigation, Irrigation practices, Inorganic compounds, Nitrogen compounds, Phosphorus compounds, Potassium compounds, Salts, Salinity, Precipitation (Atmospheric), Crop production, Crop response, Water analysis, Podzols.
Identifiers: USSR, *Ukraine, Kiev Oblast, Top-dressing.

Winter wheat in the vicinity of the Bortnichi irrigation system in the Borispol' Rayon of Kiev Oblast annually covers over 4,000 ha or about 20% of the entire cropland. Application of waste waters and fertilizers to coarse loam Podzolic soil during the 1968 dry season increased winter wheat yield from 38.2 cntr/ha to 64.7 cntr/ha, weight of 1,000 grains of wheat from 40.1 g to 44.0 g, and protein content from 10.7% to 12.2%. Application of large amounts of N120P90K90 to soils after leveling of land in 1969 more than doubled the wheat yield obtained from unfertilized plots and improved the nutritional and marketable qualities of the grain. (See also W72-11120) (Josefson-USGS)
W72-11121

EFFECTS OF WETTING ON DENSITY AND WATER PERMEABILITY OF FINE-TEXTURED SOILS (VLIYANIYE STEPENI UVLAZHNENIYA NA PLOTNOST' I VODOPRONITSAYEMOST' TYAZHELYKH POCHV),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11122

LABORATORY DETERMINATION OF THE VAPOR DIFFUSION COEFFICIENT IN DESSICATED SOIL (LABORATORNYY OPYT PO OPREDELENIYU KOEFFITSIYENTA DIFFUZII PARA V ISSUSHENNOY POCHVE),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11123

CHANGES IN NITROGEN REGIME OF PEAT SOIL AS A FUNCTION OF GROUNDWATER DEPTH (IZMENENIYE AZOTNOGO REZHIMA TORFYANOY POCHVY V ZAVISIMOSTI OT UROVNYA GRUNTOVYKH VOD),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11124

EFFECTS OF WETTING ON NITROGEN REGIME OF OLD-PLOWED PEAT SOIL, BASED ON POT TESTS (VLIYANIYE STEPENI UVLAZHNENIYA NA AZOTNYY REZHIM STAROPAKHOTNOY TORFYANOY POCHVY (PO DANNYM VEGETATSIONNOGO OPYTA)),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11125

METHODS FOR EFFECTIVE RECLAMATION OF SALINE CALCAREOUS PEAT SOILS IN THE UKRAINE (PRIYEMY EFFEKTIVNOGO OSVOYENIYA ZASOLENNYKH KARBONATNYKH TORFYANYKH POCHV USSR),
Ukrainskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kiev (USSR).
For primary bibliographic entry see Field 02G.
W72-11126

APPARATUS FOR COLLECTING WASTE FROM THE SURFACE OF A BODY OF WATER,
For primary bibliographic entry see Field 05G.
W72-11135

METHOD FOR REMOVING PHOSPHATE FROM WASTE WATER,
Calgon Corp., Pittsburgh, Pa. (assignee).
H. G. Flock, Jr., and E. G. Rausch.
U. S. Patent No. 3,655,552, 4 p, 4 tab, 7 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 611, April 11, 1972.

Descriptors: *Patents, *Waste water treatment, *Phosphates, *Nutrient removal, Water pollution, Water pollution treatment, Water treatment, Water quality, Pollution abatement, Separation techniques, Municipal wastes, Industrial wastes.

The first step consists of forming an aqueous blend of a water-soluble, high molecular weight polymer consisting of nonionic polyacrylamide containing not more than about 3 per cent carboxyl groups and a water-soluble iron containing salt. The water is then treated with 0.5 to 3.0 parts per million of the liquid blend for every 1 part per million of dissolved phosphate present. Experimental data are given in support of the claims presented. (Sinha-OEIS)
W72-11138

UNDERWATER STORAGE SYSTEM,
Underwater Storage, Inc., Washington, D.C. (assignee).
H. G. Quase.
U. S. Patent No. 3,655,051, 4 p, 11 fig, 6 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 500, April 11, 1972.

Descriptors: *Patents, Water pollution, *Sewage systems, Waste storage, Pollution abatement, Separation techniques.
Identifiers: *Underwater storage tanks.

Automatic systems are provided for the storage of sewage waste during peak periods. The storage is in large felxible walled tanks having flat rectangular bottoms with horizontal oriented inlets and outlets. When the peak systems have passed the stored sewage automatically enters the treatment system. (Sinha-OEIS)
W72-11140

MEANS FOR AUTOMATICALLY OPERATING SEWAGE TREATMENT UNITS,
R. L. Fifer.
U. S. Patent No. 3,655,050, 3 p, 3 fig, 1 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 500, April 11, 1972.

Descriptors: *Patents, *Sewage treatment, *Activated sludge, Pollution abatement, *Waste water treatment, Separation techniques, *Aerobic treatment.

This invention provides means for automatically operating the sewage treatment units described in U.S. Pat. Nos. 3,476,250 and 3,460,677 which are incorporated in this patent by reference. Air for aerobic treatment is admitted to the aeration tank. After an aeration period the air inlet valve is activated to close the air diffuser conduit device and to open the conduit connected with the upper communication zone. During the second timed cycle, after a settling period the effluent outlet valve is opened, and the aeration tank vent valve is closed. This forces air into the upper portion of the tank above the liquid in the aeration chamber to drive the liquid into the effluent outlet. A chemical injector is connected to the purification tank. When the effluent enters the purification tank the purifying chemical is automatically injected. (Sinha-OEIS)
W72-11141

METHOD AND APPARATUS FOR TREATING AND DISPOSING OF SEWAGE,
N. F. Pergola.
U. S. Patent No. 3,655, 048, 4 p, 8 fig, 1 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 499, April 11, 1972.

Descriptors: *Patents, *Sewage treatment, *Sewage disposal, Pollution abatement, Separation techniques, *Waste water treatment, Water pollution, Ships, Sea water, *Aeration, *Domestic wastes, Bacteria.

Liquid sewage separated from solid sewage is placed in a collection reservoir. The solid sewage is passed onto a filtration conveyor where the carry over liquid is filtered into a filtration reservoir and the solids transported to an incinerator. The filtered liquid is recirculated to the collection reservoir. Diffusion devices introduce air into the reservoir where suspended solids are forced to the surface and passed over a weir on to a filtration conveyor where the separation process is repeated. After recirculation the liquid passes through baffles into an effluent reservoir where it is treated to reduce the bacteria count. (Sinha-OEIS)
W72-11142

PROCESS FOR THE PURIFICATION OF WASTE WATER,
Corodex (N.V.), Zandvoort (Netherlands). (assignee).
M. Adegeest.
U. S. Patent No. 3,655,047, 3 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 499, April 11, 1972.

Descriptors: *Patents, Waste water, *Waste water treatment, *Resins, *Phenols, Organic compounds, *Chemical wastes, *Industrial wastes, Pollution abatement, Water pollution, Water pollution treatment, Separation techniques, Water purification.
Identifiers: *Formaldehyde resins.

The molar ratio of phenol: formaldehyde is altered by adding phenol so that the formaldehyde will be bound by the phenol. The ratio is changed from 1:4.18 to from 1:1.02 to 1:1.12. As a result a thin, liquid resin mixture will be separated off and formation of a viscous product is avoided. Hydrogen chloride is added to maintain normality between 0.015 and 0.10 N. The fluid is heated at plus or minus 80 - 85 degrees C for 30 hours or several days so that volatile compounds will escape. The remaining liquid is heated to at least 5 degrees below the boiling point so as to evaporate the water and thus separate it from residual unwanted substances. (Sinha-OEIS)
W72-11143

MUNICIPAL WASTE DISPOSAL,
Fermbionics, Inc., Joplin, Mo. (assignee).
H. B. Trussell.
U. S. Patent No. 3,655,046, 3 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 2, p 499, April 11, 1972.

Descriptors: *Patents, *Municipal wastes, Separation techniques, Aeration, Waste disposal, *Sewage treatment, *Waste water treatment, Garbage, *Sewage disposal, Livestock, Bacteria, Water purification.

The garbage portion of the waste is pressed into a filter matrix against the surface of a screen-type conveyor belt. As the belt is moved, sewage is poured onto the matrix and the solids are carried away to be mixed with additional garbage. The liquid which passes through the filter is purified in a normal manner. The mixture of garbage and sewage solids is pasteurized and sent to a digester where bacteria speed dissolution of solids. The digested product may be fed to livestock in liquid, meal, or in pellet form. (Sinha-OEIS)
W72-11144

RADIATION TREATMENT OF MINE WASTE WATERS,
Atomic Energy Commission, Washington, D.C. (assignee).
M. Steinberg, and J. Pruzansky.
U. S. Patent No. 3,537,966, 2 p, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol. 880, No. 1, p 216, November 3, 1970.

Descriptors: *Patents, Waste water treatment, Pollution abatement, Treatment, *Acid mine water, Mine wastes, *Iron oxides, *Radiation, Irradiation, Ionization, Industrial wastes.

The process for treating acidic mine waters containing ferrous iron compounds consists of exposing the acidic solution to an ionizing irradiation field at an intensity of at least 1000 rads per hour while aerating it until the ferrous iron compounds are converted to ferric iron compounds. Calcium carbonate is used to precipitate ferric oxide out of solution. (Sinha-OEIS)
W72-11145

TREATMENT OF WASTE EFFLUENTS,
J. F. Gustafson.
U. S. Patent No. 3,537,655, 3 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol. 880, No. 1, p 144, November 3, 1970.

Descriptors: *Patents, *Waste water treatment, *Fractionation, *Sewage treatment, *Ultrasonics, *Vibrations, Bacteria.

The effluent is divided by physical treatment (grinding then fractionating) and then partially sterilized by ultrasonic vibratory energy. The frequency at which the particular ultrasonic generator operates may be selected from a wide range extending into the megacycle band. Frequencies of the order of 20,000 cycles per second have been found effective to sterilize and fractionate the effluent. The spores of bacteria are usually sterilized in about 2 to 4 minutes. Some bacteria may require as much as 10 to 15 minutes exposure. (Sinha-OEIS)
W72-11146

APPARATUS FOR REMOVING SOLIDS FROM LIQUID SUSPENSIONS THEREOF,
Dryden Paper Co. Ltd. (Ontario).
E. G. MacDonald, and Per R. Berg-Johannessen.
U. S. Patent No. 3,537,584, 4 p, 8 fig, 3 ref; Official Gazette of the United States Patent Office, Vol. 880, No. 1, p 128, November 3, 1970.

Descriptors: *Patents, *Pulp, *Bark, *Screens, *Waste water treatment, Pollution abatement, Equipment.

This invention uses a travelling screen onto which a suspension under treatment is fed for drainage. The screen consists of an endless belt of perforated plate of uniform thickness having continuous inner and outer surfaces. The apparatus also includes means for recirculating a portion of the filtrate and means for effectively cleaning the belt during its return path of movement. (Sinha-OEIS)
W72-11147

APPARATUS FOR PURIFYING WASTE WATERS,
Menzel and Co. (Germany). (assignee).
G. Waehner, and J. Zink.
U. S. Patent No. 3,537, 583, 2 p, 5 fig; Official Gazette of the United States Patent Office, Vol. 880, No. 1, p 127, November 3, 1970.

Descriptors: *Patents, *Waste water treatment, *Water purification, *Aeration, Pollution abatement, Water pollution, Water pollution treatment.

The apparatus includes an aerating tank and a post settling tank linked with it. The aerating tank is connected through at least one conduit with an aerating blower. The run-off trough from the post settling tank is connected to a tank for thickening or concentrating the sediment or sludge. This device differs from others in having an automatic return of the water from the thickening tank into the aerating tank. The water which ascends in the thickening tank continuously runs off by itself while closed side of the discharge passage will assure that floating sediments will be retained within the space confined by the discharge passage. (Sinha-OEIS)
W72-11148

INCREASING PERMEABILITY OF REVERSE OSMOSIS MEMBRANES,
Canadian Patents and Development Limited, Canada (assignee).
For primary bibliographic entry see Field 03A.
W72-11150

SETTLING TANKS,
City of Detroit, Mich.
G. E. Hubbell.
U. S. Patent No 3,534,861, 3 p, 5 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 879, No 3, p 790, October 20, 1970.

Descriptors: *Patents, Equipment, *Sewage treatment, *Activated sludge, *Waste water treatment, Pollution abatement, Separation techniques, Water treatment, Water pollution, Water pollution treatment.
Identifiers: Settling tanks.

The settling tank includes a continuous influent chamber which extends around the tank at the base of the wall structure. Discharge from the influent chamber is accomplished via alternately arranged longer and shorter discharge pipes which should assure uniform distribution of the influent throughout the tank. The influent flows along the bottom of the tank to assure rapid settling of solids. (Sinha-OEIS)
W72-11153

EXPANDABLE AEROTOR PLANTS FOR TREATMENT OF SEWAGE AND INDUSTRIAL WASTES,
Lakeside Equipment Corp., Bartlett, Ill. (assignee).
W. L. Berk.
U. S. Patent No 3,534,857, 4 p, 10 fig, 7 ref; Official Gazette of the United States Patent Office Vol 879, No 3, p 789, October 20, 1970.

Descriptors: *Waste water treatment, *Patents, *Sewage treatment, *Industrial wastes, *Liquid wastes, *Aeration, Separation techniques, Equipment, Pollution abatement, Water purification, Water pollution treatment, *Rotors.
Identifiers: *Aerotors.

Tanks forming the various chambers are concentrically arranged around a central clarifying chamber. The waste flows from chamber to chamber. The invention provides for the vertical adjustment of the effluent weir in the final tank and also for the vertical adjustment of the cage rotor in the aeration chamber. A rotor mechanically agitates the liquid and keeps it flowing around the chamber. It can be vertically positioned so as to conform to the various levels of the liquid in the purification unit. The water level in the various chambers throughout the apparatus can be adjusted to meet load capacities now and in the future when increased capacity may be required. (Sinha-OEIS)
W72-11156

SEWAGE TREATMENT STRUCTURE,
FMC Corp., San Jose, Calif.
Q. L. Hampton.
U. S. Patent No 3,526,591, 3 p, 2 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 878, No 1, p 152, September 1, 1970.

Descriptors: *Patents, *Sewage treatment, Pollution abatement, Equipment, *Waste water treatment.
Identifiers: *Air lift.

This invention provides an improved trolley structure for supporting a traveling air lift upon a beam so that side to side movement is eliminated. An improved scum skimming mechanism travels with the air lift structure. Stirring devices are associated with the squeegees that scrape the inclined portions of the bottom wall of the tank. (Sinha-OEIS)
W72-11157

LIQUID WASTE TREATMENT APPARATUS,
J. M. Valdespino.
U. S. Patent No 3,659,714, 4 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office Vol 898, No 1, p 117, May 2, 1972.

Descriptors: *Patents, *Liquid wastes, *Waste treatment, Equipment, *Waste water treatment, Sewage treatment, Pollution abatement, Separation techniques.

The apparatus comprises a rotatable filter drum with perforated walls along its periphery. The drum acts as a centrifuge when rotated. Rotation will force the liquid through the filter material. An electrical arc or torch is placed in the drum to burn solids. A vacuum may be provided for vacuuming the burned ash. A fixed nozzle issuing compressed air at a fixed point can be used to blow burned solids into a special container. (Sinha-OEIS)
W72-11159

CHEMICAL COAGULATION OF CARBON TREATED WASTE WATER,
Westvaco Corp., New York.
C. H. Huether.
U. S. Patent No 3,658,697, 5 p, 1 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 897, No 4, p 1366, April 25, 1972.

Descriptors: *Patents, Pollution abatement, *Activated carbon, anaerobic conditions, *Hydrogen sulfide, *Flocculation, *Biological treatment, *Sewage treatment, *Waste water treatment, Biochemical oxygen demand.

Sewage is treated by first removing a portion of the suspended solids from the raw sewage then passing the effluent through at least one bed of activated carbon. A chemical agent is used to induce flocculation. The supernatant liquid is then separated from the flocculant. Hydrogen sulfide is removed during flocculation. At least 75 parts per million of a water soluble iron salt is used to precipitate the dissolved hydrogen sulfide and at least 0.06 parts per million of an anionic polyelectrolyte flocculant to coagulate the precipitate. (Sinha-OEIS)
W72-11161

SEDIMENTATION SYSTEM,
Aktiebolaget Purac (Sweden).
For primary bibliographic entry see Field 05F.
W72-11165

OXYGENATION-OZONATION OF BOD-CONTAINING WATER,
Union Carbide Corp., New York.
J. R. McWhirter, and E. K. Robinson.
U. S. Patent No 3,660,277, 9 p, 4 fig, 1 tab, 16 ref; Official Gazette of the United States Patent Office, Vol 898, No 1, p 243, May 2, 1972.

Descriptors: *Patents, *Oxygenation, *Activated sludge, *Biochemical oxygen demand, Ozone, Pollution abatement, Treatment, Water treatment, Water pollution, Water pollution treatment, Biological treatment, *Bacteria, Aeration, Equipment, *Waste water treatment.
Identifiers: *Ozonation.

A system is provided for using both ozone and oxygen for the disinfection and DO-enrichment of effluent. The activated sludge step for the treatment of BOD-containing waste water uses oxygen-rich gas for aeration and delivers an effluent which is low in BOD, yet contains substantial quantities of bacteria potentially injurious to health. The effluent is then contacted with an ozone-oxygen gas mixture in a contactor. The O3 content is depleted and a spent gas containing at least 60 per cent oxygen is withdrawn. The oxygen is then used for aeration. The effluent is disinfected and is fortified with dissolved oxygen. (Sinha-OEIS)
W72-11167

PROCESS FOR PREPARING SPECIALLY ACTIVATED SLUDGE,
A. Mimura, T. Kawano, and K. Yamaga.
U. S. Patent No 3,660,278, 4 p, 6 ref; Official Gazette of the United States Patent Office, Vol 898, No 1, p 243, May 2, 1972.

Descriptors: *Patents, *Activated sludge, *Biological treatment, *Waste water treatment, Pollution abatement, Separation techniques, *Microorganisms, Domestic wastes, Industrial wastes, Liquid wastes, Aerobic conditions, *Chemical wastes, Sewage bacteria, Bacteria, *Poisons.

This invention presents seven examples illustrating methods of preparation of an activated sludge capable of being used in the biological treatment of waste waters containing poisonous substances. Cells of specific microorganisms are combined with an activated sludge in a short period of time. Among the poisons to be dealt with are: hydrogen cyanide, nitrite compounds, phenols, aldehydes, and petroleum. (Sinha-OEIS)
W72-11168

METHOD FOR WATER AND WASTEWATER TREATMENT,
T. R. Camp.
U. S. Patent No. 3,660,284, 6 p, 10 fig, 4 ref; Official Gazette of the United States Patent Office, Vol. 898, No. 1, p. 245, May 2, 1972.

Descriptors: *Patents, Water quality, *Water treatment, *Waste water treatment, *Flocculation, Chemical reactions, Filtration, Water purification.
Identifiers: *Alum, *Ferric sulfate, Ferric chloride.

This invention claims increasing efficiency by mixing the water or wastewater with a floc forming chemical. The mixing is at a speed effecting a mean velocity gradient corresponding to a flow volume concentration less than 300 parts per million until flocculation is substantially complete. The liquid may be passed through a rapid filter or enter a second mixing stage at a lesser speed effecting a velocity gradient corresponding to a selected effluent floc volume concentration greater than 300 parts per million before passing on to subsequent treatment such as settling and filtering. (Sinha-OEIS)
W72-11169

SEWAGE TREATMENT PROCESS AND APPARATUS,
Pall Corp., Glen Cove, N.Y. (assignee).
M. E. Gilwood.
U. S. Patent No. 3,535,234, 7 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office Vol. 879, No. 3, p. 874, October 20, 1970.

Descriptors: *Patents, *Sewage treatment, Equipment, Treatment, *Wastewater treatment, Pollution abatement, Separation techniques, Water pollution, Water pollution treatment, *Activated sludge, *Aeration, Sedimentation, Vessels, Ships, Boats, Microorganisms, Biochemical oxygen demand.

This invention comprises equipment for comminuting influent sewage so as to reduce the solid particles to a size that can be digested in a heated aeration zone. The temperature is held within the range of from about 35 degrees C to about 55 degrees C to promote the growth of microorganisms therein and reduce the BOD of the mixture. Then by sedimentating out the suspended microorganisms from the mixture in the form of sludge, a clarified effluent remains. The clarified effluent is removed from the sedimentation zone and is disinfected. (Sinha-OEIS)
W72-11170

WASTE TREATMENT PROJECT IN SPENCER, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Kansas City, Mo.

Available from the National Technical Information Service as PB-203 316-D, $3.00 in paper copy, $0.95 in microfiche. October 4, 1971. 21 p, 4 fig, 2 tab.

Descriptors: *Iowa, *Environmental effects, *Sewage treatment, *Waste treatment, Anaerobic digestion, Aerobic treatment, Sewage lagoons, Trickling filters, Water pollution sources, Water pollution, Interceptor sewers, Storm drains, Disposal, Oxidation lagoons, Sewage effluents, Odor, Discharge (Water), Groundwater, Insect control, Vectors (Biological).
Identifiers: *Environmental Impact Statements.

The project will involve the construction of a waste treatment plant for Spencer, Iowa. The plant will accomodate waste from a packing house and a portion of the domestic population. It will consist of an anaerobic-aerated lagoon system, intercepting sewer, new pumping stations and force main, and odor treatment facilities. Treated effluent from the plant will discharge at a rate of 1.9. mgd. Environmental impacts include elimination of the current severe odor problem, reduction of overflows of sanitary wastes in the current intercepting sewer, reduction of organic discharges into the river, a higher BOD reduction, reduction of raw sewage discharge intothe river, and reduction of overflow bypassing. Adverse impacts include loss of 130 acres of farm land, temporary odor around the treatment plant, possible ground water contamination from the treatment plant, possible high nitrogen discharges, and odor and insect control problems due to the closeness of the plant to residential areas. Alternatives include expansion of existing facilities, stream reaeration, holding tanks and pretreatment of industrial wastes, and alternate sites. (Grant-Florida)
W72-11195

SEWAGE TREATMENT PROCESS,
Walco Chemical Co., Chicago, Ill.
F. N. Kemmer, R. S. Robertson, and R. Mattix.
U.S. Patent No. 3,637,487, 4 p, 1 fig, 4 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 894, No 4, p 1478, January 25, 1972.

Descriptors: *Patents, *Sewage treatment, Pollution abatement, *Activated sludge, *Aeration, *Waste water treatment, Sludge, Water pollution, Water pollution treatment, Separation techniques.

An improve method for handling and treating sewage sludge is provided. A portion of the sludge is converted into an active substance which is thereafter used as an aid to improve the quality of waste effluent water. Heat treatment in the presence of a conditioning agent produces the active substance. Conditioning agents can consist of any organic or inorganic compounds that are acidic and produce acidic byproducts. The dosage should be from 0.1-50 per cent by weight based on the dry weight of the sludges. Experimental test data are tabulated. (Sinha-OEIS)
W72-11270

CONTINUOUS MICROBIOLOGICAL PURIFICATION OF WASTE-WATER FROM PAPER AND WALLBOARD INDUSTRIES,
Lund Inst. of Tech. (Sweden).
I. H. Sanick, and G. Sjostrom.
Acta Polytec Scand. Vol 86, p 3-30. 1969. Illus.
Identifiers: *Pulp wastes, Birch D, Coniophora cerebella, Industrial wastes, Microbiolgoy, Pine G, Water purification, Sclerotia, Turbidity, Ultrasound, *Waste water treatment.

The fast growing strain, Coniophora cerebella, called 'G' and isolated by ultrasound treatment of a suspension of the original strain, is tolerant to extreme environmental conditions. After more than 4 yr the 'G'-strain has not shown any tendency to degenerate in the presence of other soil microorganisms. The sclerotia formed quicker than with the original strain. The sclerotium was investigated by microphotography of frozen sections. It was found that the C. cerebella G grows twice as fast on cross cuts of pine as on cross cuts of common birch. In purification tests of waste-water in a pilot plant the pH rose from 3.8 to 5.9 and from 4.25 to 6.60 after a flow distance of 72 m over the bed. The BOD (biological oxidation demand) of waste-water after purification and correction for water evaporation dropped from 2150 mg/1 to 234 mg/1 after a flow distance of 104 m over the bed. The corresponding drop in COD (chemical oxidation demand) was from 5590 mg/1 to 517 mg/1. The percentage of suspended fibres (turbidity) in waste-water after flowing a distance of 72 m over the bed dropped to 47 and to 33.3% of the original.--Copyright 1972, Biological Abstracts, Inc.
W72-11289

BREWERY EFFLUENT CONTROL, COMMENTS ON POLLUTION AND ITS ABATEMENT,
Kappele, Wright MacLeod Ltd., Toronto (Ontario).
W. Porter.
Wallerstein Lab Commun. Vol 34, No 114, p 125-143, 1971.
Identifiers: *Pollution abatement, *Brewery effluents, Canada, Water pollution control, Waste water disposal, Regulation, Effluents.

The characteristics of industrial wastes are described and discussed against the background of the need to conserve water and to meet waste disposal regulations in force in many communities of Canada and USA. Liquid brewery effluents can be classified as clear water wastes, organic wastes exhibiting a biochemical oxygen demand (BOD) and liquids containing inorganic suspended solids. The origins of such wastes in a hypothetical 500,000 barrel/yr brewery are traced, the treatment demands are listed and measures that can be taken to decrease water usage and BOD load of effluents are indicated. Eighteen of the more common tests for characterizing brewery effluents are given, accompanied by statements of reasons for making the test, sampling points and analysis and interpretation of results. A typical municipal by-law outlining sewage requirements is presented in an appendix.--Copyright 1972, Biological Abstracts, Inc.
W72-11308

THE SEPARATION OF IONIC AND ORGANIC MERCURY FROM WATER USING MILK PROTEINS, XANTHATES AND KERATIN,
Virginia Polytechnic Inst. and State Univ., Blacksburg, Dept. of Chemical Engineering.
J. A. Gideon.
M. S. Thesis, November 1971, 89 p, 4 fig, 7 tab, 74 ref. OWRR A-044-VA (1).

Descriptors: *Separation techniques, Mercury, *Water purification, Proteins, Waste water treatment.
Identifiers: *Milk protein, *Xanthates, *Keratin, *Mercury separation.

The interactions and removal of divalent mercury, monemethyl mercury and dimethyl mercury from water solutions with milk proteins, xanthates, and structural proteins have been investigated. Milk proteins, including lactalbumin, casein, whey and whole milk were tested in concentrations of one part protein per 500 parts water. Once filtered, these proteins removed up to 90% of divalent mercury from 10 ppm solutions, up to 80% of methyl mercury from a 6.5 ppm solutions and about 50% of dimethyl mercury from limited tests at 10 ppm (mercury concentrations expressed as Hg++). Using one part of sodium isopropyl xanthate per 2200 parts of solution followed by hexane extraction, removals of 98% (2 hexane washes) of divalent mercury from 10 ppm solutions and 95% removal of methyl mercury were achieved. The xanthates are commercially used as reagents in ore flotation, and removal by flotation would probably be more desirable in a practical waste treatment process using xanthates. Unusually good mercury removals were achieved using a sulfur containing structural protein, keratin (hair). Degreased human hair from a local barbershop achieved an 83% removal of divalent mercury from a 10 ppm solution using one part hair per 500 parts solution. When the solution was well agitated, one part of this hair per 500 parts solution removed 98% of the mercury from solutions containing 10 ppm. Removal was similar for monomethyl mercury and about 50% for dimethyl mercury. The use of these complexing agents for the removal of mercury from waste water is encouraging and likely similar removals would be expected for other trace metals.
W72-11317

POSSIBLE COMBINED USE OF INDUSTRIAL AND DOMESTIC SEWAGE AT AN ORE-ENRICHMENT COMBINE,
Gosudarstvennyi Meditsinskii Institut, Orenburg (USSR).
L. E. Olifson, E. N. Baltenko, O. V. Bukharin, V. N. Pozhar, and G. L. Turovets.
Gig Sanit. Vol 35, No 12, p 92-94. 1970.
Identifiers: Disinfection, Domestic wastes, Industrial wastes, Ore, Sewage disposal, Sewage treatment, *Waste water treatment, *Water reuse.

Clarified and disinfected (Chlorinated) domestic sewage may be safely used in the flotation cycle of an ore enrichment operation if it is first mixed in a ratio of 1:10 with acid (pH 2) or alkali (pH 11.0-13.5) process waters and allowed to stand for 2 days. If effected at the Gaysk Ore-Enrichment Combine, such a procedure would make use of 13,000 cu m of sewage daily.--Copyright 1972, Biological Abstracts, Inc.
W72-11343

REGIONAL SEWERAGE PLAN FOR AN 11,000-SQUARE-MILE AREA,
Camp, Dresser and McKee, Inc., Boston, Mass.
For primary bibliographic entry see Field 05G.
W72-11476

PAC-PCT PROCESS FOR WASTEWATER TREATMENT,
Envirotech Corp., Palo Alto, Cal.
G. L. Shell, and D. E. Burns.
Public Works, Vol 103, No 2, p 71-73, February 1972. 4 photo, 1 fig.

Descriptors: *Waste water treatment, *Research and development, *Feasibility studies, *Economics, *Municipal wastes, Effluents, Automation, Water quality control, Efficiencies.
Identifiers: *Physical chemical treatment (PCT), *Powdered activated carbon (PAC).

The Sanitary Research and Development Department of Envirotech Corporation is engaged in a comprehensive applied research study demonstrating the effectiveness and economics of treating municipal waste water by a variation of physical-chemical treatment (PCT), using powdered activated carbon (PAC) as a primary step in removal of organics. The processes which are being evaluated are: chemical precipitation of phosphorous compounds, coagulation-flocculation of suspended solids and gravity sedimentation in a solids-contact unit, the use of PAC in solids-contact treatment units for removal of soluble organic compounds, and a granular media filter to achieve final suspended solids removal. Physical-chemical treatment of waste water is basically a non-biological process involving liquid-solids separation, removal of organics and solids destruction. The advantages of this process over conventional biological methods are: (1) significantly reduced

land area is required, (2) treatment efficiency is not lost when biologically toxic wastes or high-strength wastes are encountered, (3) the ability to produce a high quality effluent, and (4) the possibility of increased automation with the PCT processes. (Strachan-Chicago)
W72-11479

MUNICIPAL WASTEWATER RECLAMATION,
Corps of Engineers, Stuttgart (West Germany). European Command.
W. B. Willard, Jr.
The Military Engineer, Vol 64, No 418, p 101-104, March-April 1972.

Descriptors: *Municipal water, *Reclaimed water, *Water reuse, *Water supply, *City planning, Recreation, Irrigation, Economics, Water quality control, Management, Administration.
Identifiers: *Metropolitan water resources management, Federal Water Quality Administration (FWQA).

Examples of water reuse are given. At Santee, California, waste water has been used for recreational purposes. Five bodies of water composed of reclaimed sewage were constructed in 1959. To delay eutrophication of Lake Tahoe new methods for waste water reclamation have been devised. The basic concept consists of collection of all waste water from individual and community systems within the Tahoe Basin, treatment to meet bacteriological standards for drinking water, and exportation for irrigation and recreation. It is a great economic saving to use reclaimed water in industry, but the conversion of waste water into high quality drinking water offers the greatest challenge. Groundwater recharge using municipal waste water is another means of water reuse. Waste water can be converted to potable water through the use of microorganisms. Direct cycle water reuse for municipal water supplies could come into existence by the end of this century, but only if the economics of the situation favor its use over some other method. Under the Advanced Water Treatment Research Program of the Federal Water Quality Administration (FWQA), processes have been developed and are available for the production of potable water, but some degree of overdesign must be incorporated until further full-scale testing and improvements in design, materials, and equipment are completed. It is believed that treated waste water will gain widespread acceptance as a true water source, and that the quality of the effluent will not be measured in the future by percent reduction, but will be based on more practical absolute values. (Strachan-Chicago)
W72-11483

SOLVING THE COMBINED SEWER OVERFLOW PROBLEM OF A MAJOR CITY,
Weston (Roy F.), Inc., Westchester, Pa.
For primary bibliographic entry see Field 05G.
W72-11488

THE FUTURE OF WASTEWATER TREATMENT - AN OPINION SURVEY.

Public Works, Vol. 103, No. 4, p 52-55, April 1972. 4 tab, 2 fig.

Descriptors: *Waste water treatment, *Sludge disposal, Engineering, Economics, Planning, Decision making, Technology.
Identifiers: *Opinion survey, Physical-chemical treatment.

Professional opinion was sampled by questionnaire on the future of wastewater treatment with emphasis on sludge disposal. The questionnaire was sent to city, county, and consulting engineers. Of 490 city and county officials canvassed, 190 replied. Of these, 164 were usable. The results indicate that physical-chemical and advanced wastewater treatment processes are being considered, although there is reluctance about discarding some older, tried methods. The consultants appear more willing to innovate than are the local engineers. There is a difference between what engineers think should be done, and what is actually designed. The decisions vary with respect to the economics and specifics of each situation. The more sophisticated methods could be generally applied if regulatory authority pressure demands it and economical and technological complications become less problematical in the future. (Strachan-Chicago)
W72-11493

HEALTH FACTORS AND REUSED WATERS,
Environmental Protection Agency, Washington, D.C.
W. N. Long, and F. A. Bell, Jr.
Journal of the American Water Works Association, Vol. 64, No. 4, p 220-225, April 1972. 2 photo, 19 ref.

Descriptors: *Public health, *Water reuse, *Viruses, *Bacteria, Consumptive use, Technology, Reclaimed water, Waste water treatment.
Identifiers: Viral detections, Viral properties, Virus removal.

Research regarding the determination of vital and bacterial disinfection of waters and the effects of unknown agent 'X' is needed before direct consumptive reuse of wastewaters can be sanctioned. More direct reuse of such waters is becoming a necessity in water-short areas that have growing populations and industrial requirements. Many health-related questions remain. Initiation of studies on viruses is recommended. These studies would examine: (1) the development of improved viral detection and enumeration methodology, (2) the exploration and definition of the basic properties of enteric viruses, (3) the provision of knowledge on transmission of viruses through the aquatic environment, (4) the definition of the impact of viral disease on man through associated epidemiological studies, and (5) the development of technology for the positive removal and inactivation of viruses. Additional studies are needed: (1) to investigate the potential problems from bacteria, (2) to identify and define the potential health effects of organic and other chemicals not removed by reclamation, (3) to increase reliability for wastewater-treatment plant operation, and (4) to use common sense in the approach to renovated wastewater. (Strachan-Chicago)
W72-11506

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Atlanta, Ga. Region IV.

Available from the National Technical Information Service as PB-205 588D, $3.00 in paper copy, $0.95 in microfiche. January 4, 1972. 186 p, 16 fig, 2 tab, 19 ref, 12 append.

Descriptors: *Florida, *Environmental effects, *Waste water treatment, *Water pollution control, *Sewage effluents, *Water quality control, Injection wells, Municipal wastes, Pumping plants, Recreation, Sewage districts, Sewage treatment, Waste treatment, Subsurface waters, Domestic water, Surface-groundwater relationships, Atlantic Ocean, Waste water disposal.
Identifiers: *Environmental Impact Statements.

The projects considered will form a regional system which will connect with one waste water treatment facility. One phase of the project would consist of construction of new and expanded secondary waste water treatment and disposal facilities to serve the central coastal region of Palm Beach County, Florida. Another phase would involve construction of interceptor sewers, major sewage pumping stations and force mains. The project will improve the water quality of the surface waters in Palm Beach County by removing many sources of sewage effluent from the inland waters and a number of raw discharges from the ocean environment. Unavoidable environmental effects will be those related to the actual construction of the facilities. The alternate methods considered are land disposal, disposal to nearby bodies of surface water, and deep well injection. The long-term effects of the pollution abatement program are beneficial from a water quality standpoint as the sewerage facilities will be used continuously. (Waldron-Florida)
W72-11555

GREELEY, COLORADO--EPA PROJECT NO. COLO-261 (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Kansas City, Mo.

Available from the National Technical Information Service as PB-201 386D, $3.00 in paper copy, $0.95 in microfiche. July 29, 1971. 9 p, 2 tab.

Descriptors: *Environmental effects, *Colorado, *Waste treatment, *Sewage treatment, Sewage effluents, Sewage sludge, Sewage, Water pollution sources, Aerobic treatment, Anaerobic conditions, Environmental engineering, Sewage lagoons, Treatment facilities, Irrigation, Project planning, Water pollution control, Waste disposal.
Identifiers: *Environmental Impact Statements, *Greeley (Colo).

The proposed sewage waste treatment project for Greeley, Colorado, would relocate raw packinghouse wastes plus waste activated sludge from the existing plant, to a site approximately five miles east of the city. This site will serve as the future regional treatment plant site, and this project would be the initial step in the effort to centralize treatment facilities for the area's drainage basin. There may be short periods of odor nuisance during start-up, but normal operations should control ground water contamination and odor nuisance. The effluent will be discharged into the Lone Tree Creek. These waters will not be adversely affected to the extent that their intended irrigational use would be jeopardized. Alternatives considered include alternative sites, use of aerobic type treatment processes, and expansion of facilities at the existing plant. (Widman-Florida)
W72-11558

AERATION OF LIQUID POULTRY MANURE; A STABILIZATION PROCESS OR AN ODOUR CONTROL MEASURE,
Guelph Univ. (Ontario). Dept. of Microbiology.
R. G. Bell.
Poultry Science, Vol. 50, No. 1, January 1971. p 155-158. 3 fig, 9 ref.

Descriptors: *Farm wastes, Biochemical oxygen demand, *Odor, *Aeration, *Poultry, Anaerobic digestion, *Degradation (Decomposition), Liquid wastes, *Waste water treatment.
Identifiers: Fatty-acids.

The offensive odors associated with the storage of liquid manures are caused by the accumulation of the by-products of the anaerobic decomposition of fecal organic matter. A direct relationship has been observed between the concentration of one such group of by-products, the volatile fatty acids, and the odor quality of stored liquid poultry manure. It was suggested that a 0.1% fatty acid content was an acceptable level for new facilities and 0.2% was a minimum level for the initiation of prosecutions under any proposed air pollution legislation. Aeration, on purely theoretical grounds, must be a means of preventing stored liquid manure from acquiring a foul odor since anaerobiosis and the presence of free oxygen are incompatible. In practice it is now well established that aeration is an effective way by which to control the odor of liquid manure. The present study was undertaken to ascertain whether the fatty acid content remained a reliable odor assessment

criteria for aerated stored manure; and to observe whether an aeration rate sufficient to control odor would result in the stabilization of the manure. The fatty acid content was shown to provide a reliable assessment of the odor quality of stored aerated liquid poultry manure. For satisfactory odor control in the manure storage system containing 0.562 cu. ft. of water per hen it was only necessary to satisfy 37% of the daily applied BOD. Aeration as used in the experimental system must be considered as an odor control measure and not as a stabilization process. (Bundy-Iowa State)
W72-11583

ANIMAL WASTE HANDLING AND DISPOSAL IN CONFINEMENT PRODUCTION OF SWINE,
Purdue University, Lafayette, Ind. Dept. of Animal Science.
J. H. Conrad, and V. B. Mayrose.
Journal of Animal Science, Vol. 32, No. 4, April 1971. p 811-815. 22 ref.

Descriptors: *Farm wastes, *Confinement pens, *Swine, *Odors, Farm management, Irrigation, Biochemical oxygen demand, *Aeration, *Waste water treatment.
Identifiers: Slotted floors.

Farmer-producers are becoming larger and more specialized. An estimated twenty-five percent of the hogs are produced in total confinement and another fifty percent of the hogs produced by large producers are in partial confinement during the growing and/or finishing period. As confinement feeding increases, concern about the volume of wastes excreted does also. Some procedures of measuring and facts about fecal production are discussed. An ideal manure handling system should incorporate the ultimate in automation, oxidize volatile solids, require a minimum amount of maintenance and be economical to operate. Waste disposal systems discussed include; mechanical or hand scraping and cleaning in conjunction with total hauling and spreading, a combination of scraping and flushing the wastes into a lagoon or holding pit, a slotted floor over a pit, a slotted floor over a pit with oxidation wheel, slotted floor over a lagoon, slotted floors over a pit with oxidation wheels and a lagoon, and the plow-furrow-cover technique. Another problem with swine confinement is gas generation. Some of the gases generated are toxic while others cause offensive odors. Speculation into the future has come up with this system, perhaps with slight modifications, as an acceptable one. Animals will be reared in totally enclosed buildings on slotted floors. Wastes will be flushed by recycled lagoon water into the lagoon which contains a floating aerator. Effluent containing both liquid and suspended fine solids will be used for crop irrigation. (Bundy-Iowa State)
W72-11584

ECONOMIES OF RECOVERY AND DISTRIBUTION OF ANIMAL WASTE,
California Univ., Davis.
W. J. Clawson.
Journal of Animal Science, Vol. 32, No. 4, April 1971, p 816-820, 1 tab, 9 ref.

Descriptors: *Farm wastes, Economics, Cropland, California, Waste management, *Waste disposal, *Waste treatment, *Feed lots.

No one method will satisfy the need for suitable waste management in animal agriculture. Two basic pathways seem to be available for disposal of animal waste. The first is utilization of all or parts of the animal waste where a cost is incurred and a value for the product (s) is returned. The alternative may be outright destruction or degradation of animal waste where a cost is incurred and no return is evident. Acknowledgment must be made of the fact that agriculture will be forced to stop pollution and that the additional cost of this type of waste management may not be recovered from waste alone. Future research must help provide more methods of cleaning and transporting animal wastes. Another approach is to study methods which will permit the effective growth and fattening of animals in less confined areas than is currently the case. By treating the removal and distribution of animal wastes as an expense to the animal production industry, evaluation of waste disposal methods is improved and a more intelligent evaluation of alternative methods may be made by the animal industry. (Bundy-Iowa State)
W72-11585

ANIMAL WASTE VALUE-NUTRIENT RECOVERY AND UTILIZATION,
Alabama Agricultural Experiment Station, Auburn. Dept. of Animal Sciences.
W. B. Anthony.
Journal of Animal Science, Vol. 32, No. 4, April 1971. p 779-802. 46 ref.

Descriptors: *Farm wastes, *Poultry, Swine, Cattle, Feed lots, *Waste treatment, *Waste disposal.
Identifiers: *Packing house wastes.

Livestock organic waste far exceeds the organic waste output of the human population in the United States. Livestock waste can be converted into a great resource but most waste management research is concerned with humans. However, some research has been done on using poultry waste as a feed or feed component. Tests have been made on the feeding of autoclaved poultry manure (APW), cooked poultry manure (CPW), and soybean meal (SBM) to wethers and steers. Poultry manure has also been used indirectly for chick feed. In Britain, the feeding of poultry manure to sheep and cattle seems to have been widely accepted. In addition to poultry, waste management research has been carried out on pigs and cattle. Dried pig feces have been inserted into swine finishing rations and have been fed to swine. Steer manure has been an acceptable component of swine rations and in recent years has also been used for cattle feeding. The feeding of steer manure to cattle has proven satisfactory because it (1) largely eliminated noxious accumulation of manure in the feedlot, and (2) improved the efficiency of the cow as a converter of feed to human food. To avoid harvesting steer manure each day to blend with the grain prior to feeding, the wastelage concept was developed. Wastelage is the conversion of feedlot manure into silage. Manure may also be made useful for feed by yeast fermentation or by lactic acid fermentation. (Bundy-Iowa State)
W72-11586

HANDLING AND DISPOSAL OF CATTLE FEEDLOT WASTE,
Texas Tech Univ., Lubbock.
R. C. Albin.
Journal of Animal Science, Vol. 32, No. 4, April 1971. p 803-810. 2 tab, 71 ref.

Descriptors: *Farm wastes, *Feed lots, Cattle, Water pollution, Biochemical oxygen demand, *Waste disposal, *Oxidation lagoons, *Waste water treatment.
Identifiers: Liquid handling systems, Anaerobic lagoons.

The exponential expansion of cattle feeding in the United States during the last decade has created many challenges, among which are the handling and disposal of a by-product, feedlot waste. It can be categorized as solid or semi-solid waste and runoff water for most feedlots, or as a liquid suspension from confined feeding operations. The chemical and pollutional characteristics are variable. Numerous handling and disposal systems are available for management of cattle feedlot waste. The disposal system for a commercial feedlot could be characterized as a function of several parameters, such as climate, type of ration and cattle, feedlot surface, and cattle and human population densities, with the solution stated in economic equivalents. Final disposal of feedlot waste has been on the land in most instances. The oxidation ditch and a combination of aerobic and anaerobic systems offer possibilities. Socio-industry relationships might require ultimate disposal of runoff and effluent into streams with dehydration and/or incineration of the solid waste. Use of feedlot waste as a resource material offers unlimited possibilities as a conservation approach to feedlot waste management. The need for research in feedlot waste management is urgent. Critical evaluations of handling and disposal systems for cattle feedlot waste are needed in the areas of land use, socio-legal-industry relationships, environmental pollution, conservation and economics. (Bundy-Iowa State)
W72-11587

PUZZLED ABOUT SURCHARGES. HERE'S HOW DURHAM OPERATES,
North Carolina State Univ., Raleigh. Dept. of Economics.
J. A. Seagraves.
Water and Wastes Engineering, Vol. 9, No. 3, p B-11--B-13, March, 1972. 2 tab, 2 ref.

Descriptors: *Waste water treatment, *Pollution taxes (Charges), *Separable cost allocation, *Industrial wastes, Equity, Economic efficiency, Taxes, Water pollution, *North Carolina.
Identifiers: *Separate billing, *Surcharges, Incentives, *Durham (N.C.).

The trend in municipalities such as Durham, North Carolina, is to levy surcharges on monitored industrial wastes. Presumably, these surcharges promote equity and economic efficiency. However, as an alternative to levying surcharges, cities should consider the use of separate billing. This concept would involve simply billing industries separately for the various components in the monitored wastes. The bill from the city would list the water sold, the estimated cubic feet of waste, the pounds of BOD, suspended solids, grease, etc. Each would be multiplied by its unit cost of delivery or treatment, and the sum would be the amount owed to the city. The water and sewer rates for households and commercial establishments could be based on the same unit costs and on average waste concentrations. Separate billing would be more equitable than a surcharge because users would only pay for the costs they create. More importantly, separate billing would better promote economic efficiency. The defined normal BOD level in most surcharges gives firms a strong incentive to adjust wastes exactly to the defined normal level, even if the adjustment involves private waste dilution. Separate billing would eliminate this incentive. (Settle-Wisconsin)
W72-11593

DESIGN AND ECONOMICS OF JOINT WASTE-WATER TREATMENT,
Vanderbilt Univ., Nashville, Tenn; and Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
W. W. Eckenfelder, Jr., and C. E. Adams, Jr.
Journal of the Sanitary Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 98, No. SA1, p 153-167, February, 1972. 6 fig, 7 tab, 8 ref, 4 append.

Descriptors: *Waste water treatment, *Treatment facilities, *Municipal wastes, *Industrial wastes, Capital costs, Economic feasibility.
Identifiers: *Combined treatment facilities.

In many instances, combined or joint industrial-municipal treatment facilities offer an effective economical alternative to individual treatment systems for each waste. Some pretreatment of industrial wastes may be required where acids, sulfides which will oxidize to sulfuric acid, and other chemicals which would be detrimental to the sewer structures or hazardous to humans are present. Pretreatment may also be desirable (1) to insure that the wastewaters will not have adverse effects on the operation of the combined waste-

water treatment facility, and (2) as an economic alternative to a surcharge. The need for a surcharge on industry stems from recent governmental legislation which provides that industry must pay its proportionate share for the capital and operating costs of a combined wastewater treatment facility. The factors which will significantly influence the cost of wastewater treatment are the flow rate, the concentration of BOD and suspended solids, and the biological reaction rate in the case of biological treatment facilities. Appendices provide examples of (1) capital cost development for combined treatment of municipal and industrial wastes, and (2) a cost comparison of a combined wastewater treatment plant with and without pretreatment of industrial wastes. (Settle-Wisconsin)
W72-11597

REVERSE OSMOSIS DEMINERALIZATION OF ACID MINE DRAINAGE.
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.

Copy available from GPO Sup Doc as EP 2.10:14010 FQR 03/72, $1.00; microfiche from NTIS as PB-211 020, $0.95. Environmental Protection Agency Water Pollution Control Research Series, March 1972, 110 p, 27 fig, 30 tab, 14 ref. EPA Program 14010 FQR 03/72.

Descriptors: *Acid streams, *Mine drainage, *Dissolved solids, *Separation techniques, *Reverse osmosis, *Membrane processes, Demineralization, Hydrogen ion concentration, Neutralization, Fouling, Calcium sulfate, Iron, Disinfection, Laboratory tests, On-site investigations, *Waste water treatment.

A two-phase study, involving both laboratory and field investigations, has demonstrated the feasibility of using reverse osmosis to provide potable water from acid mine drainage. The laboratory investigations involved the determination of methods for controlling iron fouling and the selection of a process flow sheet. During the field test, the process developed in Phase I was used to treat acid mine drainage from an underground abandoned anthracite coal mine. Treatment prior to reverse osmosis consisted of filtration (10 microns) followed by ultraviolet light disinfection. Brine from the RO unit was treated by neutralization, oxidation, and settling. Results obtained indicated that membrane fouling due to iron was satisfactorily controlled, but calcium sulfate fouling limited the recovery of product water to about 75%. Product water was of potable quality in all respects except for iron, manganese, and pH. Rejection of individual ions across the RO membranes ranged from 99.2 to 99.7% based on average brine concentrations. Product waters of 25 mg/l total dissolved solids were produced from a feed TDS level of 1319 mg/l. Calcium sulfate precipitate on the RO membrane was successfully removed using a solution of ammoniated citric acid at pH 8. (Lowry-Texas)
W72-11598

RECYCLE OF PAPERMILL WASTE WATERS AND APPLICATION OF REVERSE OSMOSIS,
Green Bay Packaging, Inc., Wis.
D. C. Morris, W. R. Nelson, and G. O. Walraven.
Copy available from GPO Sup Doc EP2.10:12040 FUB 01/72, $1.00; microfiche from NTIS as PB-211 021, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, January, 1972, 90 p, 29 fig, 7 tab. EPA Program 12040 FUB 01/72.

Descriptors: *Pulp and paper industry, *Industrial wastes, *Reverse osmosis, *Membrane processes, Pilot plants, Flow rates, Separation techniques, Dissolved solids, Operation and maintenance, Water reuse, *Waste water treatment.
Identifiers: *Flux.

Pilot plant reverse osmosis units were operated on weak waste waters from a pulp and paperboard mill to obtain further data on R.O. as an integral part of a closed water system within the mill. Of the many equipment types tested, the one selected was capable of concentrating a stream containing 1% dissolved solids to 99% less volume containing 10% dissolved solids. Product water thus separated was of high quality, suitable for use for stock dilution, pump shaft seal lubrication, etc. Overall flux rate for the operating portion of a plant performing to these standards was about 7 gallons/sq ft/day. The cellulose acetate membranes exhibited no significant deterioration, and a conclusion that the membranes are capable of providing a minimum of one year of continuous service is encouraged. Limited testing at higher temperatures indicated that the membranes do not deteriorate as rapidly as predicted. It is concluded that further development and commercialization will result in plants that approach the performance of industrial process equipment. (Lowry-Texas)
W72-11599

CLOSED SYSTEM WASTE MANAGEMENT FOR LIVESTOCK,
Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
P. O. Ngoddy, J. O. Harper, R. K. Collins, G. D. Wells, and F. A. Heidar.
Copy available from GPO Sup Doc EP2.10:13040 DKP 06/71, $1.25; microfiche from NTIS as PB-211 022, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, June 1971, 110 p, 28 fig, 21 tab, 19 ref. EPA Program 13040 DKP 06/71.

Descriptors: *Farm wastes, *Water reuse, *Separation techniques, Screens, Suspended solids, Particle size, Sludge, Odor, Economic feasibility, Technical feasibility, Performance, Cattle, Hogs, Analytical techniques, *Waste water treatment.
Identifiers: *Waste management.

A vibrating screen separator has been developed for liquid-solid separation of livestock wastewater. Pilot tests on swine and beef cattle wastewater have shown that the resistant or slowly biodegradable solids are effectively removed on vibrating screens ranging in mesh size from no. 60 to no. 120. Although measurably less efficient than conventional dewatering devices such as centrifuges and vacuum filters, the gravity dewatering vibrating screen separation is better suited to the economic scale of the average livestock operation. The removal of resistant solids from wastewater prior to stabilization substantially improves the performance of biological treatment systems by enhancing the controlling transport and kinetic mechanisms in such processes. Screened solids are odorless, stable, and storable over long periods without an odor nuisance or pollutional problem. The liquid fraction can be partially reclaimed by biodegradation and recycled as transport water. A number of candidate livestock waste management designs integrating the salient features of the study have been proposed. (Lowry-Texas)
W72-11600

ELIMINATION OF WATER POLLUTION BY PACKINGHOUSE ANIMAL PAUNCH AND BLOOD.
Beefland International Inc., Council Bluffs, Iowa.

Copy available from GPO Sup Doc SOD no.: EP2.10:12060 FDS 11/71, $0.50; microfiche from NTIS as PB-211 023, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, November 1971, 41 p, 15 fig, 10 tab, 6 ref. EPA Program 12060 FDS 11/71.

Descriptors: *Food processing industry, *Dehydration, *Cattle, Biochemical oxygen demand, Chemical oxygen demand, Proteins, Byproducts, Analytical techniques, Cost analysis, *Waste water treatment, *Denver.
Identifiers: *Dehydrators, Blood, Paunch, Rumen, Slaughtering plants, Dryers, Dehydration costs, Feed additives, *Council Bluffs (Iowa).

The operation of two dehydrating machines, for the drying of cattle whole blood as well as paunch contents (rumen), at the Beefland International, Inc., slaughtering plant at Council Bluffs, Iowa, was studied. The BOD5 and COD of the blood and rumen were established. The mean BOD5 of the whole blood and rumen was determined as 156,500 ppm and 50,200 ppm, respectively. The mean COD of the blood and rumen was established as 218,300 ppm and 177,300 ppm, respectively. The average cost (blood and rumen) was $40.93/ton. Laboratory studies were carried out on the dried whole blood and rumen with a view toward their actual and potential use as legally accepted feeds or feed additives. Percent moisture, protein, fat, carbohydrate, and other analyses of the dried products are reported. (Lowry-Texas)
W72-11601

AEROBIC DIGESTION OF ORGANIC WASTE SLUDGE.
Oklahoma State University, Stillwater. School of Civil Engineering.

Copy available from GPO Sup Doc EP 2.10:17070 DAU 12/71, $1.50; microfiche from NTIS as PB-211 024, $0.95. Environmental Protection Agency Water Pollution Control Research Series, December 1971, 175 p, 64 fig, 96 tab, 23 ref. EPA Program 17070 DAU 12/71.

Descriptors: *Sludge digestion, *Aerobic digestion, *Pilot plants, Laboratory tests, Analytical techniques, Domestic wastes, Aeration, Monitoring, Sewage sludge, *Waste water treatment.
Identifiers: *Aerobic sludge digestion.

Pilot plant aerobic sludge digesters were used to treat sludge from a two stage trickling filter plant. Primary sludge only, mixed primary and secondary sludge, and secondary sludge only, were digested at detention periods ranging from 2 to 36 days. The digesters received air from air diffusers located near the tank bottom. Physical and chemical analyses were made on the feed, mixed liquor, four hour settled sludge, and filtered (paper and sand bed) sludge. Most of the work involved feeding the digesters once or twice daily, although the initial runs were made using a time clock and one run was made on a batch basis. The measuring pumps clogged so frequently that actual aeration tank loadings were not accurate enough to obtain meaningful data. Data indicated considerable variation in concentration of the various parameters with aeration time and sludge source, with general trends indicating the active organisms to be in a state of flux. Results showed that aerobic digestion was a highly variable process which could produce excellent results in some cases, while yielding highly undesirable results in similar cases. (Lowry-Texas)
W72-11603

CHARACTERIZATION OF TASTE AND ODORS IN WATER SUPPLIES,
Connecticut Univ., Storrs. Regulatory Biology Section.
For primary bibliographic entry see Field 05A.
W72-11604

SLUDGE MATERIAL RECOVERY SYSTEM FOR MANUFACTURERS OF PIGMENTED PAPERS.
Scott Paper Co., Westbrook, Me. S.D. Warren Div.

Copy available from GPO Sup Doc EP2.10:12040, $1.00; microfiche from NTIS as PB-211 026, $0.95. Environmental Protection Agency Water Pollution Control Research Series, July, 1971, 95 p, 3 fig, EPA Program 12040 FES 07/71.

Descriptors: *Pigments, *Vacuum drying, *Incineration, Pulp wastes, Color, Pulp and paper industry, Sedimentation, Sludge, Temperature, Particle size, Dispersion, Economic feasibility, *Waste water treatment.
Identifiers: *Retention time, *Grit removal.

Sludges resulting from primary treatment of wastewaters generated during the manufacture of coated and/or filled papers were diluted to 0.75% solids, and subjected to pilot scale treatment involving centricleaning, dewatering by vacuum filter to 30% solids, shredding, drying, and incineration in a rotary kiln. By carefully controlling both temperature and retention time in incineration, the resulting ash produced was in the form of a mixed pigment of 84-85% G.E. brightness and acceptably low abrasiveness. Grinding and classifying in a Bauer Pulverizer produced a pigment of acceptable particle size, suitable for use as a wet end filler for the paper machines. Reuse of the reclaimed pigment as a coating pigment is not feasible because of pigment dispersion problems. The process was shown to be economically unfeasible at the present time, and future work should be directed at making the reclaimed pigment suitable for replacing the more expensive coating pigments. (Lowry-Texas)
W72-11605

AMENABILITY OF REVERSE OSMOSIS CONCENTRATE TO ACTIVATED SLUDGE TREATMENT,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
M. Gupta, and D. G. Mason.
Copy available from GPO Sup Doc as EP2.10:17040 EUE 07/71, $1.25; microfiche from NTIS as PB-211 027, $0.95. Environmental Protection Agency Water Pollution Control Research Series, July 1971, 119 p, 29 fig, 38 tab, 25 ref. EPA Program 17040 EUE 07/71.

Descriptors: *Reverse osmosis, *Membrane processes, *Desalination processes, Laboratory tests, Cellulose, Permeability, Organic compounds, Separation techniques, Chemical precipitation, Brines, Suspended solids, Aeration, *Waste water treatment.

Pilot scale tubular and spiral wound Reverse Osmosis (RO) units were utilized to establish the feasibility of renovating municipal sewage. Results indicated that prior treatment with ferric chloride and alum will be necessary even when utilizing the tubular RO system. RO produced an approximate 100 mg/ TDS of inorganic ions in the effluent, but an estimated 40 to 50% of the soluble organic material permeated the membranes at high feed water recoveries. Approximately 70% of the organic material passing the membrane was ethanol, but other organics may pass through the membranes from other sewages. 92% water recovery rates, with no precipitation problems in the RO concentrate, were achieved, but RO product waters would require further treatment for organic removal prior to discharge. The feasibility of biodegrading RO concentrates was also established, with TOC removals of 87 to 93% obtained in 4-10 hours, depending upon the suspended solids level maintained. (Lowry-Texas)
W72-11606

EFFLUENTS FROM FRUIT AND VEGETABLE PROCESSING-PART I,
S. D. Holdsworth.
Effluent and Water Treatment Journal, Vol 10, No. 3, March 1970, p 131-137, 2 fig, 2 tab, 3 ref.

Descriptors: *Industrial wastes, *Effluents, *Canneries, Fruit crops, Vegetable crops, Biochemical oxygen demand, Water reuse, Recirculated water, Cooling water, Solid wastes, Screens, Landfills.
Identifiers: Marine disposal, Spray irrigation, Characterization, Composting, Counter-current rinsing, United Kingdom.

The nature and composition of effluents from fruit and vegetable processing industries were summarized. Production figures for some processed foods and typical production and corresponding effluent characteristics from various canning factories were arranged in tabular form. A survey carried out recently with vegetable canners alone showed that the level of annual water usage was in excess of 750 million gallons, corresponding to a production of over 700 thousand tons of vegetables. General operations were similar for every process, although each product has its own special equipment. Points of effluent origin in a canning line were illustrated. Wastes from processing fruits and vegetables were described as being low in nitrogen compounds, having a BOD up to 8,000 ppm, having relatively high suspended solids and being putrefactive. Methods which utilize water reuse and recirculation have increased, especially the use of counter-current methods for washing and cooling. A typical water recirculation system used for pea freezing was illustrated. Methods of disposal of solid wastes including composting, landfill, spreading over the land and comminution followed by either marine disposal or spray irrigation were pointed out. Since soluble solids are the major form of pollution, screening does not remove substantial quantities of pollution but does prevent excessive pollution from developing. The use of a rotary screen of 10 mesh wire led to a 35% reduction of suspended solids and a 27% reduction in BOD. (See also W72-11609) (Galwardi-Texas)
W72-11608

EFFLUENTS FROM FRUIT AND VEGETABLE PROCESSING-CONCLUSION,
S. D. Holdsworth.
Effluent and Water Treatment Journal, Vol 10, No. 5, May 1970, p 265-268, 28 ref.

Descriptors: *Industrial wastes, *Canneries, *Waste water treatment, Fruit crops, Vegetable crops, Biochemical oxygen demand, Performance, Efficiencies, Activated sludge, Anaerobic digestion, Chemical precipitation, Oxidation lagoons, Trickling filters, Organic loading, Food processing industry.
Identifiers: Spray irrigation, Oxidation ditches, United Kingdom.

Various methods for the treatment of effluents from fruit and vegetable processing industries were reviewed. Methods presented included activated sludge, oxidation ditches, biological filters, spray irrigation, lagoons, chemical treatment and anaerobic treatment. Treatment of potato wastes with activated sludge showed BOD removals of up to 95% were obtained at loadings of 80 lb BOD per 1,000 lb of mixed liquor suspended solids per hour. Oxidation ditches have been used on effluents from pea, carrot, celery, beans and potato processing and results have shown that for effluents containing between 300 and 1,000 ppm BOD, the reduction in BOD ranged from 30 to 75%. Performance data for a biological filter using plastic media showed that for a BOD load which varied from 50-150 lb/1000 ft3/day an 80% reduction in BOD was obtained. An example was presented of spray irrigation in which an average BOD reduction of 97.3% was obtained. Also, chemical precipitation of carrot wastes using lime and ferrous sulfate resulted in BOD reductions ranging from 50 to 75%. Several cases were reported in which BOD reductions ranging from 80-90% were obtained using anaerobic digestion. (See also W72-11608) (Galwardi-Texas)
W72-11609

INFLUENCE OF MICROBIAL WASTE PRODUCTS ON METABOLIC ACTIVITY OF HIGH SOLIDS ACTIVATED SLUDGE,
Rensselaer Polytechnic Inst., Troy, N.Y.
J. C. Young.
Master's Thesis, May 1969, 93 p, 24 fig, 16 tab, 22 ref.

Descriptors: *Activated sludge, *Metabolism, *Food chains, *Membrane processes, Inhibitors, Laboratory tests, Separation techniques, Instrumentation, Performance, Permeability, Technical feasibility, *Waste water treatment.
Identifiers: *Metabolic end products, *Ultrafiltration.

A membrane ultrafiltration unit is currently being considered as an effluent separation device for a high solids activated sludge system. This type of separation would result in considerable metabolic end product (MEP) retention. An open reactor was operated on a feed consisting of glucose, yeast extract, ammonium phosphate and ammonium acetate, to determine the effects of MEP accumulation on the high solids microbial system activity. As predicted, a decrease in metabolic activity was observed with increased MEP content. The compounds which interfered with the culture's aerobic activity were apparently in the molecular range of 700. Organic gases or vapors produced during anaerobic decomposition resulting from culture conglomeration were large enough to significantly affect the oxygen uptake measurements. However, results were definite enough to show that some planned wasting of recirculated mixed liquor will be required for a high solids activated sludge system in order to maintain the culture's high activity levels. (Lowry-Texas)
W72-11610

AN ASIAN TECHNOLOGICAL APPROACH TO WATER REUSE SERIES FILTRATION USING LOCAL FILTER MEDIA,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 05F.
W72-11613

DEVELOPMENT OF NUMERICAL FJORD-MODELS FOR THE FUNCTIONAL PLANNING OF A REGIONAL WASTE WATER DISPOSAL SYSTEM,
Norsk Institutt for Vannforskning, Blindern.
T. Simensen, and H. Munthe-Kaas.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 10, Hall B, Paper No 20, June 21, 1972. 10 p, 8 fig, 1 tab, 8 ref.

Descriptors: *Regional analysis, *Mathematical models, *Water quality control, Sampling, Monitoring, Digital computers, Data processing, Technical feasibility, Economic feasibility, Nutrients, Eutrophication, Phosphorus, Design criteria, Cost analysis, *Waste water treatment.
Identifiers: *Norway, *Regional wastewater disposal, *Submarine outfalls.

An extensive physical/chemical program over a 4-year period, totalling more than 600,000 observations, was the background for the assessment of a tentative mass balance in Oslo Fjord. The mass balance, combined with statistical treatment of data, formed the basis for empirical relationships (mathematical models) which could be generalized and used to predict changes in the pollution situation resulting from the use of various alternative treatment methods for the wastewaters. Regression analysis techniques were used to determine the correlation between secchi disc depth observations and phosphate levels. In the technical-economical analysis of various alternatives to the regional wastewater disposal system, computer programs have been made for all necessary calculations. 16 main alternatives have been studied, but with some basic variable manipulation, more than 50 alternatives have been handled. The final design selected involved: (1) 50 km of tunnel to transport most of the wastewater to a disposal site far south in the inner basin; (2) use of mechanical treatment and submarine outfall facilities at the tunnel end on the west side of the fjord, with provisions made for initiating chemical treatment

as soon as possible. Total initial and running cost of the 140 mgd plant was estimated at $70 million. (Lowry-Texas)
W72-11614

POWDERED ACTIVATED CARBON APPLICATION, REGENERATION AND REUSE IN WASTEWATER TREATMENT SYSTEMS,
Envirotech Corp., Salt Lake City, Utah. Eimco Process Machinery Div.
G. L. Shell, and D. E. Burns.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 10, Hall C, Paper No 20, June 21, 1972. 10 p, 2 fig, 3 tab, 11 ref.

Descriptors: *Activated carbon, *Particle size, *Performance, *Cost comparisons, Technical feasibility, Economic feasibility, Pilot plants, Operation and maintenance, Temperature, Incineration, Vacuum drying, Adsorption, *Waste water treatment.
Identifiers: *Granular carbon, *Powdered carbon, Carbon regeneration.

Analysis of existing operating data and cost estimates indicated that the greatest potential application of powdered activated carbon (PAC) systems is for: (1) moderate to weak soluble organic wastes; (2) moderate quality effluent requirements; and/or (3) plant sizes less than 5 mgd. A 2 year study of a 100 gpm pilot plant was conducted to evaluate the applicability of PAC for municipal wastewater treatment by: (1) establishing gravity thickening and vacuum dewatering characteristics and operating parameters; (2) establishing fluidized bed regeneration operating parameters; (3) determining the regenerated PAC effectiveness by reuse. With a sand bed temperature of 1540F, the resulting freeboard temperature was 1510F, furnace operation was stable, and carbon losses amounted to 17%. Six week averages of pilot plant operation comparing virgin carbon with once to twice regenerated carbon showed essentially no degradation of the carbon with regard to COD removal effectiveness. The major problem encountered with the fluidized bed regeneration furnace, that of non-preferential ignition of bed injection gas in deference to carbon, must be solved before any further progress can be made. (Lowry-Texas)
W72-11615

A RATIONAL DESIGN PROCEDURE FOR AERATED LAGOONS TREATING MUNICIPAL AND INDUSTRIAL WASTEWATERS,
Vanderbilt Unit., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
W. W. Eckenfelder, Jr., C. D. Magee, and C. E. Adams, Jr.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 10, Hall A, Paper No 20, June 21, 1972. 11 p, 5 fig, 1 tab, 22 ref.

Descriptors: *Aerated lagoons, *Design criteria, *Kinetics, Anaerobic conditions, Aerobic conditions, Aeration, Mixing, Depth, Biochemical oxygen demand, Suspended solids, Temperature, *Waste water treatment.
Identifiers: *Active mass, *Detention time, *Power levels.

An investigation of the kinetics of aerated wastewater treatment lagoons has shown that the effluent BOD is independent of the initial BOD concentration. This conclusion was reached after examination of various data revealed that higher initial concentrations resulted in higher equilibrium biological solids levels and, hence, higher overall BOD removal rates. However, the unit BOD removal rate remains proportional to the BOD concentration in the lagoon. In addition, the direct influence of biological solids has been eliminated in favor of the active mass concept, since the active mass portion of the biological solids changes with detention time. The benefits of multi-stage systems relevant to single basins were found to be marginal in warm climates treating relatively low strength wastes, but of greater importance in colder climates attributed to thermal effects. A step by step design procedure, developed from the various data collected and studied, is also presented. (Lowry-Texas)
W72-11616

INFLUENCE OF TEMPERATURE AND TURBULENCE ON THE OXYGEN TRANSFER IN WATER,
For primary bibliographic entry see Field 05G.
W72-11618

PROBLEMS IN THE OPERATION OF PLANTS TREATING MIXED INDUSTRIAL WASTES,
Research Inst. for Water Resources Development, Budapest (Hungary).
P. Farkas.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 11, Hall C, Paper No 22, June 22, 1972. 15 p, 5 fig, 4 tab, 16 ref.

Descriptors: *Industrial wastes, *Activated sludge, *Mathematical models, *Metabolism, Biodegradation, Kinetics, Design criteria, Organic loading, Toxicity, Chemical oxygen demand, Biochemical oxygen demand, Monitoring, Analytical techniques, Costs, *Waste water treatment.
Identifiers: *Treatability, Formaldehyde.

The three conditions of trouble-free plant operation include: (1) effluent quality (BOD5 or COD) should not exceed the limiting value prescribed; (2) no great fluctuations in waste load should be tolerated; and (3) poisoning should be avoided since it may make an entire new start-up necessary. Industrial wastes, however, can create problems in each of these areas which can also cause considerable economic and legal entanglements. A rigorous mathematical analysis of the biodegradation mechanisms with reference to readily removable substrates, removable but toxic substrates, and poisonous substrates was conducted. These models, along with other data, were then used to develop formulas for effluent quality predictions. Examples of experimental results with formaldehyde, slaughterhouse blood discharge, and mixtures of acetate and copper are presented as examples of the types of systems encountered. (Lowry-Texas)
W72-11619

REUSE, RECOVERY LOWER POLLUTION FROM BREWERY.

Environmental Science and Technology, Vol 6, No 6, June 1972, p 504-505. 2 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Water reuse, Activated sludge, Organic loading, Nutrients, Carbohydrates, Sludge treatment, Treatment facilities, Vacuum drying, Dewatering, Proteins, By products.
Identifiers: Brewing industry, Adolph Coors Company, Product recovery, By-product production, Livestock feeds.

The Adolph Coors Co., has been able to cut pollution considerably by reusing water and reclaiming brewing by-products, rather than discharging them directly to their treatment plant. Beer has a BOD of more than 125,000 mg/l, and by cooling waste beer in evaporative condensers, Coors not only reduced their organic loading considerably, but produced a syrup which could be used as a binder to form livestock pellets from spent grains and hops. Waste yeast was also dried and made into a high-protein poultry feed supplement. With such recovery procedures, Coors was able to reduce plant loading from about 4,000 mg/l BOD to roughly 1600 mg/l. Due to the high carbohydrate content of its waste, Coors has modified their activated sludge system by injecting small amounts of highly digested sludge directly into the activated sludge return. This procedure has stopped the rapid growth of Spherotilus natans. Also, nitrogen and phosphorus must be added to the waste prior to treatment. Coor's waste sludge has been dewatered by a vacuum filter and the dewatered sludge has been mechanically turned into nearby land. Experiments are being conducted to test the feasibility of drying the sludge further as the sludge contains 44% protein making it an ideal candidate for use in animal feeds. (Galwardi-Texas)
W72-11620

THE COMPLETE TREATMENT OF RAW SEWAGE WITH SPECIAL EMPHASIS ON NITROGEN REMOVAL,
National Inst. for Water Research, Pretoria (South Africa).
W. A. Pretorius.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 10, Hall C, Paper No 21, June 21, 1972. 6 p, 1 fig, 4 tab, 14 ref.

Descriptors: *Nitrification, *Denitrification, *Aerobic conditions, *Anaerobic conditions, Nitrates, Ammonia, Pilot plants, Sampling, Laboratory tests, Methane, Chemical oxygen demand, *Waste water treatment.

A three-stage experimental wastewater treatment unit was assembled, utilizing an anaerobic stage, an aerobic nitrification stage, and an anaerobic denitrifying stage for the removal of nitrogenous compounds. The anaerobic stage consisted of a Sedigester and Biophysical Filter (BPF), the aerobic nitrifying stage consisted of a rotating disc unit (RDU), and the final stage consisted of another RDU provided with an airtight hood. Samples taken twice daily from the influent and effluent of each unit were analyzed for total COD, BOD, Kjeldahl nitrogen, ammonia, nitrates, and orthophosphate. Use of the anaerobic stage as an integral part of the system accomplished a lowering of the COD loading on the subsequent aerobic stage, as well as supplying electrodonors for denitrification. Although all of the chemical conditions for denitrification were met, complete denitrification of the final effluent was not obtained. The nitrate concentration was reduced by the nitrifying RDU at a rate independent of the incoming concentration, indicating that either the disc surface area, or hydrogen donor transfer rate, or both, were limiting. These preliminary results have demonstrated the technical feasibility of producing from raw sewage a water with low COD and nitrogen concentrations. (Lowry-Texas)
W72-11621

THE FULL SCALE REFINEMENT OF PURIFIED SEWAGE FOR UNRESTRICTED INDUSTRIAL USE IN THE MANUFACTURE OF FULLY BLEACHED KRAFT-PULP AND FINE PAPER,
National Inst. for Water Research, Pretoria (South Africa).
L. R. J. VanVuuren, J. W. Funke, and L. Smith.
Preprint, presented at Sixth Internation Water Pollution Research Conference, Session 11, Hall B, Paper No 22, June 22, 1972. 10 p, 2 fig, 3 tab, 5 ref.

Descriptors: *Flotation, *Flocculation, *Aluminum, *Polyelectrolytes, Separation techniques, Domestic wastes, Industrial water, Water reuse, Pulp and paper industry, Pilot plants, On-site investigations, Heavy metals, *Waste water treatment, Treatment facilities.

Following extensive pilot plant testing, a full scale water reclamation plant was constructed to produce 32,000 m cu/day of municipal wastewater for unrestricted reuse by ENSTRA mill of South African Pulp and Paper Industries, Ltd. The treatment units included full stream aeration and flotation using alum, caustic soda, and polyelectrolytes. Although the removal of heavy metals

with alum was not as high as the removals achieved with lime, subsequent investigations showed that the 100 mg manganese and 30-50 mg iron/kg of bone dry pulp attributed to contamination from other sources was far greater than the amounts contained in the recycled effluent. The water quality criteria as reported in the literature for recycling systems were not correct in this instance, and it is suggested that they must be evaluated for each individual case. While demonstrating the alum flotation process on a large scale as capable of producing from purified sewage a process water suitable for unrestricted industrial use, it was further demonstrated that a cost savings of 2 c/m cu as compared with RWB water would be realized. (Lowry-Texas)
W72-11622

ASPECTS OF SLUDGE DISPOSAL IN GREATER LONDON,
Greater London Council (England). Dept. of Public Health Engineering.
S. H. Dainty.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 7, Hall B, Paper No. 14, June 21, 1972. 12 p, 1 fig, 1 tab, 11 ref.

Descriptors: *Sludge disposal, *Administration, *Sedimentation, Activated sludge, Vacuum drying, Filtration, Incineration, Sludge digestion, Dewatering, Operation and maintenance, Odor, *Waste water treatment, Waste disposal.
Identifiers: *Ocean dumping.

A review of sludge accumulation, separation, transportation, and disposal within the greater London area is presented. Factors which influence volume and quality of the sludge, including primary sedimentation and sludge return, were discussed. The conclusions were that primary sedimentation is an indispensable facet of sludge disposal, both from an economic and technical viewpoint. Similar attention was given to sludge separation, automated sludge separation, and pumping. The reasons for digesting sludge were given as: (1) weight reduction of solid matter requiring disposal; (2) to render the sludge relatively inoffensive; (3) to reduce the risk of pathogens; (4) to reduce the fat/grease content; (5) to produce methane for power production; and (6) to assist subsequent dewatering. Other sludge treatment and disposal methods currently practiced include dewatering, mechanical treatment (vacuum filtration, etc.), incineration, land spreading, and disposal to sea. Studies are currently underway to evaluate the effects of all types of sludge disposal, and especially in regards to ocean dumping, more complete co-operation between nations for informational exchange in such fields is being sought. (Lowry-Texas)
W72-11623

SELF-PURIFYING ACTIVITY OF SEA WATER: PROPOSAL FOR LOW COST TREATMENT OF A WELL DEFINED AREA,
Naples Univ. (Italy). Istituto di Igiene.
For primary bibliographic entry see Field 05G.
W72-11626

EFFICIENCY OF FE3+ AND AL IN PHOSPHORUS REMOVAL FROM MUNICIPAL WASTEWATERS. PRACTICAL COMPARISON AT A TREATMENT PLANT,
Solvay et Cie., Brussels (Belgium).
P. Dalcq, and R. Rutschi.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 9, Hall B, Paper No 18, June 21, 1972. 9 p, 6 fig, 5 tab, 6 ref.

Descriptors: *Phosphorus, *Chemical precipitation, *Salts, *Aluminum, *Iron, Domestic wastes, On-site investigations, Laboratory tests, Sedimentation, *Waste water treatment.

Effluent from a Swiss waste water treatment plant treating domestic wastes from 220,000 inhabitants was subjected to full scale testing of both iron and aluminum salts as methods of chemically precipitating phosphorus. The tests were performed on the entire 1.13 mcu/sec dry weather flow after mechanical treatment and primary settling. Test effluents were analyzed for permanganate value, total P, ortho P, and pH, both before and after chemical addition. Molecular yields of P elimination of more than 0.9 were obtained in practice with the simultaneous process, with these yields depending naturally on contact time, making it justifiable to recycle the sludge in the physical purification stage with similar PO4 concentrations in sewage. Al produced lower elimination molecular yields than Fe3+, this also having been observed in sewage works which have used the two reagents successively. In the simultaneous process, a molar ratio of Al/Fe3+ of 1.3 to 1.5 was computed. Thus the choice of the reagent will depend on the respective costs of Al and Fe3+ salts in ready to use solutions. (Lowry-Texas)
W72-11627

DESIGN OPTIMIZATION FOR ACTIVATED SLUDGE AND EXTENDED AERATION PLANTS,
National Inst. for Water Research, Pretoria (South Africa).
J. L. Barnard.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 4, Hall B, Paper No 7, June 20, 1972. 9 p, 7 fig, 1 tab, 8 ref.

Descriptors: *Activated sludge, *Synthesis, *Sludge digestion, Suspended solids, Biodegradation, Laboratory tests, Mathematical models, Solubility, Organic loading, Nitrification, Temperature, Analytical techniques, Regression analysis, Design criteria, *Waste water treatment, *Aeration.
Identifiers: *Sludge production, *Sludge age.

Four laboratory scale activated sludge units, of 10 liters each, were fed skimmed milk and powdered milk solutions to obtain data needed for the experimental verification of a mathematical sludge production model. Data from previous work on synthetic sewage of egg albumin and beef extract, as well as data obtained from a soluble organic chemicals waste water were also correlated with the model. The equation for sludge production which was developed is: delta Xv = Xo (l-f) + a Sr - Kb x Xv, where delta Xv = change in volatile sludge mass, Xo = non-soluble material mass, Sr = synthesis, Xv = volatile sludge mass in the reactor, and f, a, Kb, and x are co-efficients whose values can be determined experimentally in the laboratory. For F/M ratios in excess of 0.5 to 1.0, the active mass is considerably decreased, as is X, the active mass coefficient. The equation then reduces to: delta Xv = a Sr - bXv. However, at the lower loadings used for extended aeration plants, the previous equation must be used to accurately predict excess sludge production and sludge age. Further study is needed to determine the variability in the coefficients Kb and a for different waste waters. (Lowry-Texas)
W72-11628

EFFECT OF DISSOLVED SALTS ON THE FILTRATION OF COLIFORM BACTERIA IN SAND DUNES,
Ambient Purification Technology, Inc., Riverside, Calif.
J. Goldshmid, D. Zohar, Y. Argaman, and Y. Kott.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 9, Hall C, Paper No 18, June 21, 1972. 9 p, 7 fig, 1 tab, 12 ref.

Descriptors: *Coliforms, *Filtration, *Dissolved solids, *Water reuse, Disinfection, Sands, Particle size, Coagulation, Colloids, Hydrogen ion concentration, Separation techniques, Salts, *Waste water treatment.
Identifiers: *Agglomeration.

Plans for the Dan Sewage Reclamation Project call for infiltration through sand dunes, followed by a 400 to 800 day lag period, as the final treatment step before pumping the reclaimed sewage from the aquifer into the drinking supply. Bacterial filtration experiments were carried out in a 3.9 cm diameter Perspex pipe filled with dune sand to a 10 cm height and the sand compressed by tapping on the pipe wall. The bacterial suspension was pumped through at a constant rate of 1 ml/min. Results indicated that an increase in cation concentration and valence increased filtration efficiency of coliform bacteria through dune sand, the effect being similar to that predicted from Shulze-Hardy laws regarding coagulation of colloids. Further results included: (1) the presence of oxidation pond effluents caused a requirement for more cations to achieve the same filtration efficiency; (2) bacteria were found to stay alive even after attachment to the sand particles; (3) no bacterial agglomeration was observed; (4) pH decrease from 9.3 to 3.9 increased filtration efficiency; and (5) cation concentration effect on filtration efficiency was found to be reversible. (Lowry-Texas)
W72-11629

THE EFFECT OF VARYING FOOD-TO-MICROORGANISM RATIOS ON PHOSPHATE UPTAKE IN AN ACTIVATED SLUDGE ENVIRONMENT,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
M. R. Collins.
Master's Thesis, March 1972. 48 p, 14 fig, 5 tab, 31 ref.

Descriptors: *Activated sludge, *Separation techniques, *Phosphate, Kinetics, Adsorption, Solubility, Sludge, Aeration, Analytical techniques, Hydrogen ion concentration, Laboratory tests, *Waste water treatment.
Identifiers: *Food to microorganism ratio, *Acclimatization.

Two laboratory scale batch studies were conducted to clarify the importance of the Food-to-Microorganism (F/M) ratio and to evaluate the nature of phosphate uptake in the activated sludge environment. F/M values used were 0.20, 0.75, 1.25, and 2.00. Phosphate concentration was allowed to vary in the first batch study, but was held constant during the second. Soluble COD, pH, and soluble PO4 measurements were taken for all sludge samples, while sludge total phosphorus content measurements were performed on selected samples. Results demonstrated: (1) phosphate removal in an activated sludge environment is primarily biochemical in nature; (2) total phosphorus content of activated sludge cells increases directly as the F/M ratio increases; (3) the primary phosphate uptake mechanism in activated sludge is not adsorption; (4) aeration times required for substrate stabilization and maximum soluble phosphate uptake increase as the F/M ratio increases; (5) optimum soluble phosphate removal occurred at F/M ratios of 0.75 to 1.25; and (6) initial sludge phosphate content is pH dependent. (Lowry-Texas)
W72-11630

AN EVALUATION OF VACUUM ROTARY THIN-FILM EVAPORATION FOR THE CONCENTRATION OF TRACE ORGANICS,
Rensselaer Polytechnic Inst., Troy, N.Y.
P. E. Fredette.
Master's Thesis, November 1968. 41 p, 1 fig, 6 tab, 12 ref.

Descriptors: *Analytical techniques, *Organic compounds, *Volatility, *Vapor pressure, Radioactive isotopes, Temperature, Evaporation, Distillation, Laboratory tests, Taste, Odor, *Waste water treatment, Water quality control.
Identifiers: *Trace organics.

Radioactive glycerol, acetic acid, and acetone samples of 1 part per billion concentration were prepared for testing to evaluate rotary thin-film

evaporation as a method for concentrating trace dissolved organics without degradation or polymerization. The system used was a thin-film rotary evaporator operating under vacuum with traps at various temperatures, each colder than the previous trap. These traps served as the means of selectively trapping and differentiating compounds by their degree of volatility. Percent recovery was then determined by liquid scintillation counting. The percent recovery was shown to vary for each experiment and compound. Thin-film evaporation can be used, however, to concentrate trace organics at a 1 ppb initial concentration provided their volatility is low. Those compounds with low vapor pressures can be expected to have a high percentage of recovery, and conversely. (Lowry-Texas)
W72-11631

COMPARISON OF THIN-FILM EVAPORATION AND FREEZE DRYING METHODS OF CONCENTRATION OF ORGANICS IN WATER,
Rensselaer Polytechnic Inst., Troy, N.Y.
For primary bibliographic entry see Field 05G.
W72-11632

THE EFFECT OF SLUDGE WITHDRAWALS ON THE OPERATION OF SMALL ACTIVATED SLUDGE PLANTS,
Rensselaer Polytechnic Inst., Troy, N.Y.
K. E. Drautz.
Master's Thesis, June 1969. 111 p, 15 fig, 34 tab, 17 ref.

Descriptors: *Activated sludge, *Sludge digestion, *Operation and maintenance, *Design criteria, Monitoring, Sampling, Laboratory tests, Biochemical oxygen demand, Chemical oxygen demand, *Waste water treatment.
Identifiers: *Process control, *Sludge withdrawals, *Dehydrogenase activity.

The effects of sludge withdrawals, under both normal and abnormal conditions from the aeration basin of two extended aeration activated sludge plants were evaluated. The parameters used included: (1) BOD; (2) carbon content, (3) COD, (4) plate count; (5) total volatile suspended solids; and (6) dehydrogenase activity. From the data at different time intervals in addition to volume of flow it was then possible to compare the effect of sludge withdrawals on the process. Results indicated that: (1) periodic sludge withdrawals are more beneficial to the proper operation of activated sludge plants than daily sludge transfers; (2) large or excessive sludge withdrawals do not hurt the process, and in some cases may actually increase treatment efficiency by stimulation of organism growth; and (3) in the case of abnormal transfers, results showed a definite trend toward the return of the biological system to normalcy in a brief time span. (Lowry-Texas)
W72-11633

TREATMENT OF METAL PROCESSING WASTES,
Rensselaer Polytechnic Inst., Troy, N.Y.
R. W. Landis.
Master's Thesis, January 1971. 62 p, 12 fig, 15 tab, 14 ref.

Descriptors: *Minerals industry, *Separation techniques, *Chemical precipitation, Sedimentation, Chelation, Flocculation, Coagulation, Hydrogen ion concentration, Chemical oxygen demand, Laboratory tests, *Waste water treatment, *Ohio.
Identifiers: *Metal hydroxides, *Metal finishing wastes, *Elyria (Ohio).

The effectiveness of various treatment methods for metal finishing wastes from the Fisher Body Plant at Elyria, Ohio was investigated. Various problems occurred in the treatment processes, primarily hindered settling of metallic hydroxide floc particles in the clarifier. Various treatment parameters were altered during laboratory tests using the same treatment methods as were employed in the Fisher Plant. Methods found to increase the settling rate included lowering the pH to 7.0 and increasing the dosage of coagulant aid. The decrease in pH, however, resulted in incomplete precipitation of the metal hydroxides and was therefore abandoned. BOD test results were inconclusive due to incompatibility of the seed with the liquid wastes, but COD tests indicated that the plant is discharging an effluent with a significantly reduced COD content. (Lowry-Texas)
W72-11634

THE REMOVAL OF COPPER IONS FROM SOLUTION USING A FLUIDIZED BED OF ION EXCHANGE RESIN,
Rensselaer Polytechnic Inst., Troy, N.Y.
T. C. Miller.
Master's Thesis, August 1967. 55 p, 5 fig, 7 tab, 21 ref.

Descriptors: *Copper, *Separation techniques, *Ion exchange, *Resins, Laboratory tests, Sampling, Analytical techniques, Kinetics, Mixing, Density, Heavy metals, *Waste water treatment.
Identifiers: *Fluidized beds, *Elution, *Exhaustion.

Dilute solutions of copper sulfate were prepared and pumped through beds of cation exchange resin at velocities sufficient to fluidize the bed, to determine the feasibility of applying fluidized bed ion exchange for cooper ion removal. Samples of resin withdrawn from various depths in the bed and analyzed for copper content demonstrated that saturated particles will be located at the bottom of the bed while unsaturated particles will remain near the top. This principle could be utilized for the removal of exhausted resin on a continuous basis, provided a removal mechanism could be devised. It was also demonstrated that beds using larger particles exhibited leakage much sooner than beds using smaller particles, largely accounted for by the higher velocities necessary to keep the larger particles fluidized. Parallel investigations with fixed bed reactors using the same resin showed no advantage for the fluidized bed operation. (Lowry-Texas)
W72-11635

REDOX POTENTIAL-A GUIDE TO OXIDATION POND PERFORMANCE,
Auckland Univ. (New Zealand).
O. D. Brockett, and P. Welsby.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 10, Hall A, Paper No 19, June 21, 1972. 9 p, 5 fig, 2 tab, 3 ref.

Descriptors: *Oxidation-reduction potential, *Oxidation lagoons, *Monitoring, Performance, Instrumentation, Aerobic conditions, Anaerobic conditions, Depth, Metabolism, Sludge digestion, Nutrients, *Waste water treatment.

Measurements of oxidation-reduction potential were made in a full scale oxidation pond at various depths. An area was selected which contained a thick layer of digesting sludge which was also close to a power supply. The three important zones selected for study were the sludge, sludge-liquor interface, and pond top liquor 10-15 cm below the surface. Collection of data was restricted to two seasons, winter when oxidation pond activity is at a minimum, and summer when activity is at a maximum. Allowing for minor variation, the redox potentials of oxidation pond liquor and sludge-liquor interface show a distinctly diurnal pattern. The duration of electropositive values in pond top liquor corresponds to hours of sunshine. Positive peaks in the interface data are of shorter duration with a suggestion of a lag until evening in reaching the maximum in winter time. The sludge was always electronegative with remarkably constant values. Since pond deterioration must be assumed to be largely associated with weather conditions, redox potentials, while not providing a remedy, may be useful as an early indicator of pond instability. (Lowry-Texas)
W72-11636

COMBUSTION DISPOSAL OF MANURE WASTES AND UTILIZATION OF RESIDUE,
Tuscaloosa Metallurgy Research Lab., Ala.
E. G. Davis, J. H. Brown, and I. L. Feld.
Available from the National Technical Information Service as PB-206 892, $3.00 in paper copy, $0.95 in microfiche. Bureau of Mines Solid Waste Research Program, Technical Progress Report No 46, January 1972. 9 p, 1 fig, 5 tab.

Descriptors: *Farm wastes, *Solid wastes, Incineration, Evaporation, Drying, Temperature, Ammonia, Phosphorus, Potassium, Fertilizers, *Waste treatment.
Identifiers: *Soil conditioners, *Combustion.

Samples of horse, hog, dairy cow, broiler chicken, and egg farm chicken manures, as well as feed lot cattle manures were collected and incinerated in both a fluidized bed reactor and a rotary kiln. These tests involved drying of the beed at 90C, size reduction to pass through 10 mesh, and preheating of both the reactor and the fluidizing air for the fluidized bed reactor. These tests demonstrated that the oven dried animal manures would support combustion and be self-sustaining when using air preheated to 250C. Reductions of 90% in weight and 85% in volume were obtained in both reactors. Heat balance calculations revealed that there is sufficient heat to preheat the air and dry the wet manure prior to feeding to the fluid bed when operating on the dried manure. All of the nitrogen can be recovered as ammonia from the exhaust gases, and the potassium and phosphorus concentrate in the solid residue. The residues produced were suitable for use as soil conditioners. (Lowry-Texas)
W72-11637

COMPARISON OF DISCHARGES FROM URBAN STORMWATER RUNOFF, MIXED STORM OVERFLOW AND TREATED SEWAGE,
Allmanna Ingenjorsbyran, Stockholm (Sweden).
G. Soderlund, and H. Lehtinen.
Preprint, presented at Sixth International Conference on Water Pollution Research, Session 9, Hall A, Paper No 17, June 21, 1972. 10 p, 7 fig, 4 tab, 12 ref.

Descriptors: *Combined sewers, *Separated sewers, *Sampling, Storm drains, Storm runoff, Rainfall intensity, Rainfall-runoff relationships, Instrumentation, Suspended solids, Biochemical oxygen demand, Nitrogen, Phosphorus, Water quality control, Waste water treatment.
Identifiers: *Stockholm.

Two urban drainage districts with separated sewer systems, located in Stockholm, were sampled to determine the pollutional content of storm runoff coming from specific installations within a drainage system, as well as from the drainage system as a whole. Rainfall intensity and total rainfall were measured on pluvigraphs, and flow in the storm water sewers was continuously monitored. Results showed that storm water runoff contained considerably greater amounts of suspended solids, but lesser amounts of BOD, phosphorus and nitrogen than the treated sewage. Over a 600 hour period, contribution by storm-water runoff was 20 times the suspended solids, twice the BOD, and 15 percent of the phosphorus and nitrogen contributed by the treated sewage. These results demonstrated also that the pollution potential of flows from separated sewers is just as great as the pollution potential of flows from combined sewers. (Lowry-Texas)
W72-11638

MODEL IDENTIFICATION OF WET-AIR OXIDATION PROCESS THERMAL DECOMPOSITION,
T. Takamatsu, S. Sioya, and I. Hashimoto.
Water Research, Vol 4, 1970. p 33-59, 20 fig, 5 tab, 10 ref.

Descriptors: *Sludge treatment, *Mathematical models, *Oxidation, *Heat treatment, Statistical methods, Activated sludge, Regression analysis, Weight, *Chemical oxygen demand, Temperature, Pressure.
Identifiers: *Wet-air oxidation process, *Thermal decomposition, Reaction rates, Method of steepest descent.

The thermal decomposition reaction by the wet-air oxidation of artificially grown activated sludge was investigated. Experiments to measure the thermal decomposition reaction in which sludge is decomposed without oxygen were conducted in a magnetically stirred autoclave at a temperature range of 170-250C and a pressure range of 60-130 hg/cm2-gage. During these batch experiments the weight or the COD value of the solid matter greatly decreased, but the weight or the COD value of the soluble matter increased. Measurements of changes in weight and COD values versus reaction time were conducted. A mathematical model of the thermal decomposition process with respect to weight changes and COD values was developed. Variables considered in the models were COD and weight of solid matter, soluble nonevaporative matter and soluble evaporative matter. The parameters of the mathematical model were estimated from experimental data by using the steepest descent method. Finally, the prediction of the change of COD was made by linear regression models after the weight of each variable was calculated from the model of the thermal decomposition process based on weight. (Galwardi-Texas)
W72-11640

THE DAN REGION LARGE SCALE OXIDATION PONDS,
Water Planning for Israel Ltd., Tel-Aviv. Dan Region Sewage Reclamation Project.
Y. Folkman, M. Kremer, and P. G. J. Meiring.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 7, Hall C, Paper No 15, June 21, 1972. 12 p, 4 fig, 2 tab, 14 ref.

Descriptors: *Oxidation lagoons, *Municipal wastes, *Water reuse, Algae, Photosynthesis, Dissolved oxygen, Aerobic conditions, Anaerobic conditions, Organic loading, Odor, Sludge, Cost analysis, Nitrogen, Clays, *Waste water treatment.
Identifiers: *Recirculation ratio, *Israel (Dan region).

Although most designers relegate oxidation lagoons to only the smallest installations, large scale oxidation lagoons designed to handle 22,000 cu. m. per day of raw sewage have been giving satisfactory performance with excellent reductions of all indicators of pollution. The ponds are presently operating at their overall design load of 230 kg BOD/day/hectare of surface area, but loading is to be increased quite gradually. The performance of the primary ponds depends almost entirely on the 1.5 to 1 recirculation rate of effluent from the last pond in the recirculation pond system back to the primary pond. No odor problems or sludge build-up problems have been encountered. Cost of sewage treatment in the secondary ponds was increased to 2.6 U. S. cents per cubic meter treated because of the quantities of sand dunes to be moved, as well as the necessity of lining the bottoms. However, a 65 to 70% reduction of an average 90 mg/l total nitrogen influent is accomplished at this price, far less than the cost of removing nitrogen by any other biological means. (Lowry-Texas)
W72-11642

SPENT COFFEE GROUNDS TURNED TO PROFIT,
Western Kentucky Univ., Bowling Green.
M. T. Bond, and L. W. Canter.
Water and Sewage Works, Vol 117, No 3, March-April 1970. p IW/11-IW/15, 6 fig, 13 ref.

Descriptors: *Solid wastes, *Industrial wastes, *Mechanical equipment, Time, Temperature, Incineration, Lime, Nutrients, Fertilizers, Laboratory equipment, Laboratory tests, Economics, *Waste treatment.
Identifiers: *Coffee grounds, *Composting, Windrow composting, Thermophilic heat recovery, Soil conditioner.

Based on production of soluble coffee, approximately 144,000 tons of solid waste as spent coffee grounds were produced annually on a national basis. Spent coffee grounds can be incinerated after drying with an economic benefit resulting if heat recovery principles are utilized as spent coffee grounds have a heat value of approximately 9,000 BTU/lb. The use of spent coffee grounds as a composted soil conditioner was investigated by laboratory simulation of both mechanical composting and windrow composting. It was shown that composting could be accomplished with the addition of 1.0 lb of lime as a buffer and 0.25 lb of a balanced 8-8-8 fertilizer per 100 lb of spent coffee grounds. Due to the fineness of the particles, a mechanical composting process was recommended. A time interval of approximately two weeks was required before the temperature inside the mechanical composter dropped below the thermophilic level; therefore, two weeks was the suggested time interval for composting. Approximately 35 percent of the dry solids would be removed during a 2 week compost cycle and thus a yield of about 47 lb of dry composted material from each 132 lb sack of green beans used in the manufacture of soluble coffee could be obtained. (Galwardi-Texas)
W72-11643

MARINE DISPOSAL OF DIGESTED SCREENED WASTEWATER SOLIDS,
For primary bibliographic entry see Field 05E.
W72-11644

FORMAL DISCUSSION OF 'MARINE DISPOSAL OF DIGESTED SCREENED WASTEWATER SOLIDS',
Pomeroy, Johnston, and Bailey, Pasadena, Calif.
For primary bibliographic entry see Field 05E.
W72-11645

FORMAL DISCUSSION OF 'MARINE DISPOSAL OF DIGESTED SCREENED WASTEWATER SOLIDS',
Rofe and Raffety, London (England).
For primary bibliographic entry see Field 05E.
W72-11646

REVERSE OSMOSIS FOR WATER RECLAMATION,
General Dynamics, San Diego, Calif. General Atomic Div.
V. Merten, and D. T. Bray.
Advances in Water Pollution Research, Vol 3, 1966. p 315-325, 5 fig, 2 tab, 18 ref.

Descriptors: *Reverse osmosis, *Water reuse, *Municipal wastes, *Equipment performance, *Membranes, Size, Permeability, Selectivity, Retention, Calcium magnesium, Phosphates, Sulfates, Chemical oxygen demand, Alkylbenzene sulfonates, Dissolved solids, Ammonia, Nitrogen, Time, *Waste water treatment.
Identifiers: *Cellulose acetate membrane, Multivalent ions, Univalent ions.

A reverse osmosis system for water reclamation was investigated. Previous studies in this area and the characteristics of cellulose acetate membranes were reviewed. The reverse osmosis system consisted of five spiral-wound membrane modules operating in parallel. Each module was 30 cm long and contained about 5,000 sq cm. of active membrane area. Feed water consisted of municipal waste water which had received secondary treatment and had been passed through a diatomaceous earth filter. Three different membrane types were utilized. All were of cellulose acetate, but the final heat treatment was varied so that membranes of various permeabilities and selectivities were obtained. Analytical results obtained for three of the modules tested were arranged in tabular form. Retention of the multivalent ions calcium, magnesium, the phosphates and sulfate were excellent, but univalent ions were not as well retained by the high-selectivity membranes. Sharp reductions in COD, ABS and total dissolved solids were obtained with the more selective membranes, but the reduction of ammoniacal nitrogen was not as good although the most selective membrane effected a fivefold concentration reduction. The flow behavior of the high-selectivity modules indicated a 20 percent decline in permeability over the 1,500 hour test period. (See also W72-11648 and W72-11649) (Galwardi-Texas)
W72-11647

FORMAL DISCUSSION OF 'REVERSE OSMOSIS FOR WATER RECLAMATION',
Polytechnic Inst. of Brooklyn, New York.
H. P. Gregor.
Advances in Water Pollution Research, Vol 3, 1966. p 326-327.

Descriptors: *Reverse osmosis, *Water reuse, *Municipal wastes, Membranes, Performance, Hydrogen ion concentration, Porosity, Organic matter, Dissolved solids, Chemical oxygen demand, Selectivity, Costs, *Waste water treatment.
Identifiers: Cellulose acetate membranes, Leob-type membranes, Power consumption.

The effects of hydrogen-bonding, pH of influent water, porosity, and contamination by organic matter on cellulose acetate membranes used in reverse osmosis systems for water reclamation were discussed. It was reported that power requirements consumption at approximately three or four times the theoretical is not uncommon and the cost of equipment is still largely an unknown factor. Limited information on the operation of reverse-osmosis devices has been available. However, a unit using the Leob-type membranes was operated for over 600 hr with more than 90% desalinization of a 1500 mg/l influent and more than 90% rejection of COD from an initial level of 80. It would appear that only the product water from the moderate and highly selective membrane modules would be satisfactory. (See also W72-11647 and W72-11649) (Galwardi-Texas)
W72-11648

FORMAL DISCUSSION OF 'REVERSE OSMOSIS FOR WATER RECLAMATION',
Washington State Univ., Pullman.
E. Hindin.
Advances in Water Pollution Research, Vol 3, 1966. p 327-331, 2 tab, 7 ref.

Descriptors: *Reverse osmosis, *Water reuse, *Municipal wastes, Performance, Sodium, Pressure, Time, Enteric bacteria, Bacteriophage, Efficiencies, Membranes, Laboratory tests, Permeability, Biological treatment, Effluents, *Waste water treatment.
Identifiers: Flux, Inorganic cations, Organic anions, Cellulose acetate membrane.

Studies at Washington State University have shown the feasibility of using the principles of reverse osmosis as a means of reclaiming potable water from biologically treated effluents. A Schleicher and Schuell Co. type B-18 membrane was found the most satisfactory of the commercially available cellulose acetate membranes examined with removals of 66-89% of sodium from a 1,000 mg/l sodium ion saline solution at a flux of 8-25 gpd/sq. ft. and a pressure of 105 atm. After 312

hr. of continuous use the flux decreased 35 percent and the ability to remove sodium ions decreased 27 percent. Results from permeation studies of 12 inorganic ions and ABS conducted on a reverse osmosis unit operated at a pressure of 102 atm and flux of 20 gpd/sq. ft. were arranged in tabular form. Also, the permeation of nine inorganic cations and five organic anions was investigated. In most cases the percent reduction decreased with increase in concentration. Each cation in an aqueous mixture of the chlorides of ammonium, calcium, magnesium, sodium, and potassium had greater retention than each cation when present singly in an aqueous solution. Also, enteric microorganisms, serratia marcescens, and two types of phage did not pass through the membrane. (See also W72-11647 and W72-11648) (Galwardi-Texas)
W72-11649

VIRUS REJECTION BY THE REVERSE OSMOSIS-ULTRAFILTRATION PROCESSES,
Texas Univ., Austin. Center for Research in Water Resources.
C. A. Sorber, B. P. Sagik, and J. R. Malina, Jr.
Available from the National Technical Information Service as AD-735 750, $3.00 in paper copy, $0.95 in microfiche. Technical Report to the U. S. Army Mobility Equipment Research and Development Center, 1971, EHE-71-9, CRWR-82, 86 p, 13 fig, 19 tab, 67 ref. DAAK 02-71-C-0145.

Descriptors: *Viruses, *Separation techniques, *Membrane processes, Laboratory tests, Analytical techniques, Polyelectrolytes, Hydrogen ion concentration, Temperature, *Reverse osmosis, Public health, *Waste water treatment.
Identifiers: *Ultrafiltration.

Various concentrations of coliphage T2 and poliovirus were inoculated in the feed water of a bench scale ultrafiltration-reverse osmosis unit to determine the efficiency of commercial grade asymmetrical cellulose acetate membranes in rejecting viruses. The insoluble polyelectrolyte virus concentration technique was used to allow determinations of small initial viral titers. Waters used were Phosphate Buffered Saline (PBS) and lake water, both for testing the efficiency of the insoluble polyelectrolyte method, and for use as feed to the reverse osmosis ultrafiltration units to be tested. The cellulose acetate membranes rejected from 99.2 to over 99.999 percent of the coliphage T2 and poliovirus present in the feed solution. Penetration of the membranes by the viruses was shown to be a random phenomenon over a broad range of feed water virus concentrations. (Lowry-Texas)
W72-11650

5E. Ultimate Disposal of Wastes

BURYING YOUR PICKLE LIQUOR DISPOSAL PROBLEM,
Kaiser Engineers, Inc., Chicago, Ill.
R. D. Smith.
Civil Engineering, Vol 39, November 1969, p 37-38. 1 fig, 4 ref.

Descriptors: *Acid streams, *Deep wells, *Waste water disposal, Mineral industry, Geologic mapping, Permeability, Suspended solids, Diatomaceous earth, *Ohio, Filtration, Instrumentation.
Identifiers: *Waste pickle liquor, *Subsurface injection, *Rock strata, *Middletown (Ohio).

Armco Steel Corporation's strip rolling and processing complex at Middletown, Ohio, will produce up to 100 gpm of spent acid pickle liquor containing 0-1% hydrochloric acid, 20-25% ferrous chloride, 0-2% ferric chloride, and a temperature of 200F. Deep well disposal was the most feasible method of providing indefinite isolation at a reasonable cost. After intensive testing to further insure safety, feasibility, and efficiency, a system was developed to first filter the waste through diatomaceous earth precoat filters to remove suspended solids, with an in-line turbidimeter automatically diverting liquor with detectable solids to avoid plugging of the sandstone pores. This deep well system meets the following essential criteria: (a) a permeable injection zone compatible with the spent liquor; (b) a sufficiently large reservoir volume; (c) an injection zone isolated by rock strata above and below; (d) no known geological faults or improperly plugged wells; (e) satisfactory injection pressures at desired flows; and (f) existing brines in the area were of no practical value. (Lowry-Texas)
W72-11094

INDUSTRIAL MANAGEMENTS' CONCERN,
General Motors Corp., Detroit, Mich.
For primary bibliographic entry see Field 05D.
W72-11108

METHOD AND APPARATUS FOR TREATING AND DISPOSING OF SEWAGE,
For primary bibliographic entry see Field 05D.
W72-11142

MUNICIPAL WASTE DISPOSAL,
Fermbionics, Inc., Joplin, Mo. (assignee).
For primary bibliographic entry see Field 05D.
W72-11144

SUPERVISOR OF THE HARBOR PERMIT PROGRAM FOR WASTE DISPOSAL IN THE ATLANTIC OCEAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 05G.
W72-11265

OCEAN OUTFALL EXTENSION PROJECT, CARMEL SANITARY DISTRICT, CARMEL, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, San Francisco, Calif., and California State Water Control Board, San Francisco.

Available from the National Technical Information Service as PB-202 585D, $3.00 in paper copy, $0.95 in microfiche. September 1971. 20 p, 3 fig, 58 ref.

Descriptors: *California, *Outfall sewers, *Environmental effects, *Discharge (Water), *Sewage effluents, Wastes, Effluents, Eutrophication, Sewers, Conveyance structures, Engineering structures, Nozzles, Waste water (Pollution), Waste disposal, Pipes, Irrigation, Evaporation, Percolation.
Identifiers: *Environmental Impact Statements.

This project would involve the construction of an ocean outfall sewer extension in Carmel Bay off the central coast of California. The project is an interim solution to an immediate pollution problem in the area and the ultimate long term solution will be the complete discontinuance of discharging effluents into Carmel Bay. The wastes are currently being discharged through a cast-iron pipe terminating 200 feet from shore. The proposed outfall would extend this 895 feet. The principal environmental impact will be to lower existing conditions of pollution near the shore line in Carmel Bay. Temporary biological damage can be expected along the route of the trench in which the outfall pipe will be placed. Creation of a long waste plume would represent an undesirable adverse aesthetic effect. Alternatives to the project include a longer outfall sewer extending seaward beyond Carmel Bay, and land disposal by irrigation and evaporation-percolation ponds. The extension and land disposal were rejected as too expensive. Percolation would lead to accelerated eutrophication of Carmel River. (Nielson-Florida)
W72-11266

HYDRODYNAMICS IN DEEP AQUIFERS OF THE ILLINOIS BASIN,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 02F.
W72-11291

WASTEWATER MANAGEMENT PROJECT MUSKEGON COUNTY, MICHIGAN,
Illinois Univ., Chicago. Center for Urban Studies.
For primary bibliographic entry see Field 03F.
W72-11381

ACID-IRON WASTE DISPOSAL AND THE SUMMER DISTRIBUTION OF STANDING CROPS IN THE NEW YORK BIGHT,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W72-11570

ASPECTS OF SLUDGE DISPOSAL IN GREATER LONDON,
Greater London Council (England). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 05D.
W72-11623

MARINE DISPOSAL OF DIGESTED SCREENED WASTEWATER SOLIDS,
N. B. Hume, and W. F. Garber.
Advances in Water Pollution Research, Vol 3, 1966. p 243-257, 8 fig, 4 tab, 19 ref.

Descriptors: *Sludge disposal, *Oceans, *Municipal wastes, *Ultimate disposal, Screens, Sludge digestion, Anaerobic digestion, Aesthetics, Public health, Public benefits, Ecological distribution, Coliforms, Depth, Discharge lines, Surveys, *California.
Identifiers: Marine disposal, *Los Angeles (Calif), Hyperion Waste Water Treatment Plant, Santa Monica Bay.

Development of the Los Angeles metropolitan area has made ocean disposal of waste water and treated solids the most logical alternative. The City of Los Angeles has carried on a comprehensive oceanographic program for the past 10 years in order to insure the preservation of all beneficial uses of Santa Monica Bay. Examination of the substantial amounts of data obrained has indicated that the public health, aesthetic and ecological values of the receiving waters have been little affected by the discharge from a complex carefully engineered to prevent degradation of these values. The Hyperion Treatment Plant of the City of Los Angeles has discharged 325,000 lb/day of digested solids into 300 ft. of seawater 7 miles from shore. Approximately 300 mgd of mixed effluents with their residual solids have been discharged into 210 ft. of seawater 5 miles from shore. Coliform levels at all survey stations have been well within prescribed public health limits. All solids have received a 2-pass screening through 7 mesh screens prior to discharge. Although 160 tons/day of digested solids have been discharged at a single point, essentially no buildup has been recorded. An increase in volatile matter was noted in the first inch of bottom sands from 1.4 percent to a value which has leveled off at 2.2 percent. Results from bottom organic matter studies conducted over the 225 sq. mile monitor area over a 6 year period were arranged in tabular form. (See also W72-11645 and W72-11646) (Galwardi-Texas)
W72-11644

FORMAL DISCUSSION OF 'MARINE DISPOSAL OF DIGESTED SCREENED WASTEWATER SOLIDS',
Pomeroy, Johnston, and Bailey, Pasadena, Calif.
R. D. Pomeroy.
Advances in Water Pollution Research, Vol 3, 1966. p 257-259, 1 ref.

Descriptors: *Sludge disposal, *Oceans, *Municipal wastes, *Ultimate disposal, Settling basins,

Overflow, Skimming, Stratification, Thermocline, Depth, Distance, Winter, Summer.
Identifiers: Marine disposal, Los Angeles, Overflow rates, Floatable material, Isothermal.

Deep skimming baffles and efficient facilities for the removal of floatable material should be given prime consideration in the design of plants to treat sewage for marine disposal. The new sedimentation tanks constructed by the City of Los Angeles when the new sewage outfall was placed in use were designed for a rate of 2,000 gpd/sq. ft. The coast of California has been a favorable place for disposal of sewage with only primary treatment, because fairly deep water can be reached at a moderate distance and density stratification helps to keep the sewage field mostly submerged. It was reported that the sewage field over a 35 m deep ocean outfall was more dilute and had a lower bacterial concentration in the summer, when the thermocline developed at a depth of about 10 m, than in the winter, when the sea was nearly isothermal. (See also W72-11644 and W72-11646) (Galwardi-Texas)
W72-11645

FORMAL DISCUSSION OF 'MARINE DISPOSAL OF DIGESTED SCREENED WASTEWATER SOLIDS',
Rofe and Raffety, London (England).
C. B. Townsend.
Advances in Water Pollution Research, Vol 3, 1966. p 259-261.

Descriptors: *Sludge disposal, *Oceans, *Municipal wastes, *Ultimate disposal, Sludge digestion, Costs, Operating costs, Anaerobic digestion, Activated sludge.
Identifiers: Marine disposal, United Kingdom, London, Manchester.

The effects brought about by each state of improvement by the City of Los Angeles covering screening, chlorination, primary and secondary treatment with both high-rate and standard-rate aeration, as well as extensions of outfall lengths, have been shown clearly. These developments in ocean discharge were of great interest with respect to the maritime conditions of the United Kingdom, where no less than 30 percent of the country's waste waters are finally discharged to tidal waters. Sixteen percent of all sludges from treatment plants have been barged to sea for ultimate disposal. Costs were reported for London as being $3-5/1000 lb of dry solids on the daily production of 950,000 lb and for Manchester as being $6.25/1000 lb on the smaller output of 156,000 lb. When both Manchester and London progressed to full activated sludge treatment, they also had to adopt digestion in order to minimize sludge volumes, and thus the costs of their shipping operations. (See also W72-11644 and W72-11645) (Galwardi-Texas)
W72-11646

5F. Water Treatment and Quality Alteration

NEW YORK COMMUNITY IMPROVES WATER SUPPLY SYSTEM,
Metcalf and Eddy, New York.
G. P. Fulton.
Water and Sewage Works, Vol 117, No 5, May 1970, p 144-147. 1 tab.

Descriptors: *Water treatment, *Filters, Pumping plants, Automatic control, Treatment facilities, Sludge treatment, Sludge disposal, Settling basins, Freezing, Chlorine, *New York.
Identifiers: *Rapid sand filters, Anthrafilt, Alum, *Auburn (NY).

The City of Auburn, New York has completed improvements to its water supply system which included additions and alterations to the existing upper raw water pumping station and to the lower booster pump station delivering treated water to the distribution system. The major system improvement was the addition of a 5 mgd rapid sand filter plant to operate in parallel with the existing slow sand filter facilities. Improvements to the pumping stations consisted of control equipment for automatic operation and for remote supervisory control. Also, two 16 mgd electric motordriven booster pumps were installed. The rapid sand filter plant consists of chemical feed equipment for alum and chlorine, a 72 ft. diameter clarifier and three, 15 ft. x 26 ft. anthrafilt filters. A control console monitors all filter plant equipment operation. A distinguishing feature of the new filtration plant facilities was that the building and structures were of a design compatible with a neighborhood zoned exclusively for residential development. A turbine headrace at the lower pumping station has been converted to a waste handling facility to receive clarifier sludge blowdown and filter backwash flows. The raceway was divided in half with one section to serve as a settling basin. The settled sludge will periodically be transferred to the adjoining basin by portable pump during winter months. The amount withdrawn should be such that it will freeze thoroughly by layers. The granular consistency of the accumulated solids should permit easy disposal as landfill. (Galwardi-Texas)
W72-11103

SEDIMENTATION SYSTEM,
Aktiebolaget Purac (Sweden).
L. G. Malm.
U. S. Patent No 3,659,720, 3 p, 2 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 898, No 1, p 119, May 2, 1972.

Descriptors: *Settling tanks, *Patents, *Water purification, Sewage treatment, Sedimentation, Separation techniques, *Water treatment, *Waste water treatment, Pollution abatement, Water pollution, Water pollution treatment, Water quality.

This invention utilizes the vertical sedimentation principle in sedimentation basins having large diameters. This is done by placing one or more concentrically positioned elements in the basin to draw off the clear water phase. One or more fall pipes interconnect the elements with discharge pipes that are placed in connection with the bottom of the basin. (Sinha-OEIS)
W72-11165

METHOD FOR WATER AND WASTEWATER TREATMENT,
For primary bibliographic entry see Field 05D.
W72-11169

STANDARDS FOR ESTIMATION OF DRINKING AND INDUSTRIAL WATER WITH A STRESS ON WATER REHABILITATION PROCESSES BY TREATMENT WITH OZONE (OZONIZATION) AND WITH CHLORINE DIOXIDE TO IMPROVE THE TASTE AND SMELL OF WATER,
State Inst. of Hygiene, Warsaw (Poland).
J. Kelus, and C. Sikorowska.
Biul Sluzby Sanit Epidemiol Wojewodztwa Katowickiego. Vol 14, No 2, p 113-118. 1970.
Identifiers: Chlorine, Criteria, Potable water, Industrial water, *Organoleptic properties, Ozonization, Water purification, *Standards, Taste, Odor, *Water quality.

The most widely used and established standards are the organoleptic criteria, i.e. the taste and flavor of water. The original 5-grade criterion of smell intensity has now been improved by the introduction of the so-called threshold flavor. A water sample is diluted until the smell disappears; the estimation is based on the multiple of dilution.--Copyright 1972, Biological Abstracts, Inc.
W72-11212

ATTITUDE OF US PUBLIC HEALTH SERVICE IN DEVELOPMENT OF DRINKING WATER STANDARDS, 1961,
Public Health Service, Washington, D.C. Div. of Water Supply and Pollution Control.
For primary bibliographic entry see Field 05G.
W72-11394

DETERMINATION OF OPTIMUM STORAGE IN DISTRIBUTION SYSTEM DESIGN,
Dallas, City Water Utilities, Tex.
For primary bibliographic entry see Field 04A.
W72-11395

WATER QUALITY STANDARDS,
For primary bibliographic entry see Field 05G.
W72-11396

TOXICOLOGIC METHODS FOR ESTABLISHING DRINKING WATER STANDARDS,
Robert A. Taft Sanitary Engineering Center, Cincinnatti, Ohio.
For primary bibliographic entry see Field 05G.
W72-11397

ACTION NOW - A VIEW FROM CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
J. W. Jardine.
Journal of the American Water Works Association, Vol 64, No 5, p 271-274, May 1972. 3 photo.

Descriptors: *Water management (Applied), Water resources development, *City planning, *Water treatment, Financing, Technical societies, *Illinois, *Treatment facilities.
Identifiers: *Metropolitan water resources management, *Chicago.

Chicago has an 'Action Now' program, not only for its water system, but concerning all facets of its development. Since 1955, 'Action Now' has invested over $320,000,000 in the Chicago water system for the improvement of plants and facilities. The service area has increased by 100 square miles. At present, the water system serves about 4,500,000 people residing in Chicago and 72 suburban communities, i.e., over 41% of the population of Illinois. The central water filtration plant is the largest single addition to the water system. The problem of water treatment plant waste disposal has been studied, funded, and put into the 'Action Now' phase. Two new electrically operated stations have been placed in service, so that the water system is not dependent upon a single private utility for its energy requirements. Chicago's present 5-year capital improvement program allocates money for new feeder mains, small-main extensions, and the cleaning and lining of existing water mains. 'Action Now' can be a continuing program. One of the key elements for a successful improvement plan is participation through technical associations with others having common interests. (Strachan-Chicago)
W72-11477

PROTECTING COMMUNITY WATER SUPPLIES,
Environmental Protection Agency, Washington, D.C.
R. D. Lee.
Journal of the American Water Works Association, Vol 64, No 4, p 216-219, April 1972. 3 photo, 5 ref.

Descriptors: *Water supply, *Water quality control, Water treatment, *Utilities, *Public health, Management, Monitoring, Protection.
Identifiers: *Community Water Supply Study, Surveillance.

Frequent laxity of standards and slipshod practices by some water utilities have been revealed by the Community Water Supply Study. An assessment of public health protection provided by a

water supply is based on the overseeing by a public agency of the monitoring activities every water utility should conduct to produce and deliver safe, wholesome, and potable water to its customers. Such surveillance includes regular engineering evaluations of sources of supply, treatment facilities, adequacy of operation, and protection in the distribution systems. Additionally, the surveillance agency should require the utilities to furnish, for its review, the results of bacteriological and chemical monitoring tests that have been performed in approved laboratories. Agency failure to provide laboratory services does not relieve the utility from its monitoring responsibilities. The utility should conduct sanitary surveys of water sources, treatment plants, and distribution systems to be sure it can continuously discharge its responsibility to deliver safe water. Cross-connection control is an integral part of the sanitary surveys and the utility management must diligently pursue every possibility to detect and eliminate the hazards. Better methods of quality surveillance and greater responsibility for safe water on the part of the utilities are needed. (Strachan-Chicago)
W72-11480

HEALTH FACTORS AND REUSED WATERS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 05D.
W72-11506

AN ASIAN TECHNOLOGICAL APPROACH TO WATER REUSE SERIES FILTRATION USING LOCAL FILTER MEDIA,
Asian Inst. of Tech., Bangkok (Thailand).
R. J. Fraenkel, and A. S. Sevilla.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 11, Hall B, Paper No 21, June 22, 1972. 9 p, 5 fig, 1 tab.

Descriptors: *Water treatment, *Filtration, *Porous media, Laboratory tests, Flotation, Oil, Sands, Turbidity, Color, Biochemical oxygen demand, Coliforms, Separation techniques.
Identifiers: *Rice husks, *Coconut husks.

Four columns, 13.5 cm square by 2 meters deep, were used in laboratory scale filtration tests on both raw and burnt rice husks, coconut fiber, and locally obtainable charcoal and pea gravel. The charcoal was discarded as useless, but % removal efficiencies for the other products tested on a 100-400 JTU influent were: (1) pea gravel, 30-60% for a 72 hour run; (2) raw rice husks, 65-95% for a 90 hour run; (3) burnt rice husks, 93-99% for a 16 hour run; and (4) shredded coconut husks, 93-99% for a 120 hr. run. Higher head losses occurred more quickly in the burnt rice husks, indicating their possible use in tertiary or polishing filters. A water treatment scheme employing a shredded coconut husk roughing filter, providing removals of BOD, turbidity, color, and coliforms ranging from 30-80%, followed by a burnt rice husk or combination burnt rice husk/sand filter provided total removal efficiencies that approach 99% for color, turbidity, and coliforms, and possibly 95% for BOD. Savings anticipated will arise from chemical coagulant elimination, reduced chlorine demand, design and structure simplicity of the filter units, reduced labor requirements, lower level of operator training required, and reduced operation and maintenance costs. Pilot scale investigations are proceeding. (Lowry-Texas)
W72-11613

THE ROLE OF THE WATER FACTOR IN THE SPREAD OF INTESTINAL INFECTIONS,
For primary bibliographic entry see Field 05B.
W72-11692

5G. Water Quality Control

A FLUSHING SYSTEM FOR COMBINED SEWER CLEANSING.
FMC Corp., Santa Clara, Calif. Central Engineering Labs.
For primary bibliographic entry see Field 05D.
W72-11089

FLUIDIC VORTEX BUBBLE GENERATOR.
Bowles Fluidics Corp., Silver Spring, Md.
For primary bibliographic entry see Field 05D.
W72-11090

THE PRODUCTION OF CHARCOAL FROM BAGASSE,
Hawaii Univ., Honolulu. School of Public Health.
R. F. McCauley, N. C. Burbank, Jr., and R. H. F. Young.
Proceedings, Industrial Waste Conference, 25th, May 7-9, 1970, p 551-558. 1 tab, 6 ref.

Descriptors: *Industrial wastes, *Sugar cane, *Economic feasibility, Cost comparisons, Cost analysis, Temperature, Compaction, Fuels, Market value, *Hawaii, Waste treatment.
Identifiers: Charcoal production, *Bagasse, Briquettes, Heat value, Power production.

The production of charcoal from bagasse, a solid waste resulting after the extraction of sugar from sugar cane was investigated. Bagasse can be utilized as fuel for the operation of sugar mills and in terms of fuel oil of equal heat value, wet bagasse now has a value of $8 to $10 per wet ton. Charcoal was produced in laboratory studies by two methods: (1) in a specially constructed pipe retort; and (2) by use of open 300 ml containers. Charcoal yields averaged 29 percent at distillation temperatures between 425 and 600C. Tar and distillate averaged 36 percent and gas production, having a heat value of 300 BTU/ft3 averaged 10 liters/100 g of bagasse. With open 300 ml containers, the charcoal yield varied from 24.4 percent at 600C to 31 percent at 400C. Briquetting problems were solved y the use of Swift's protein colloid, Fluid Z-2236 Binding Acid, a moisture content of 60 to 62 percent and a compaction process. Several commercially available binding agents which are dust inhibitors were test sprayed on the briquettes so as to provide a coating. The least value of the bagasse charcoal briquettes was established as 15,000 BTU/lb. An economic analysis for the production and marketing of bagasse charcoal was presented. Charcoal production would be a feasible outlet for excess bagasse selling for $2 to $4 per wet ton. Hawaii has an annual bagasse waste of 7 million tons of which 4.2 million tons is burned for power and the rest poses serious disposal problems. A survey revealed that the lowest retail price for charcoal in Hawaii was 7.7 cents per pound. (Galwardi-Texas)
W72-11098

EFFLUENT STANDARDS FOR INDUSTRIAL RIVERS,
Mersey and Weaver River Authority (England).
C. Lumb.
Water Pollution Control, Vol 68, Part 3, 1969, p 300-306. 2 tab, 12 ref.

Descriptors: *Effluents, *Standards, *Regulation, *River systems, *Industrial wastes, Aerobic conditions, Biochemical oxygen demand, Oil, Toxicity, Heavy metals, Color, Temperature, Dissolved oxygen, Suspended solids, Water quality control.
Identifiers: Effluent standards, Industrial rivers, Sewage fungus, Grease, England.

Some general considerations of water quality requirements in relation to parameters of pollution and appropriate effluent standards for industrial rivers were discussed. Maintenance of aerobic conditions, freedom from sewage fungus, freedom from oil, grease and floating scum, freedom from toxic substances, and limitation of suspended solids were considered essential. An effluent standard in the range of 20-40 mg/l BOD was considered technically feasible in most cases. However, the BOD of the receiving water should be considered in establishing a permissible BOD effluent load. Also, the concept that purified sewage effluents discharged to industrial rivers should include a minimum content of nitrate was presented. The control of the oxygen consuming properties of storm-sewage discharges presented a problem in establishing effluent standards. Sewage fungus growth was reported to be significant only when the BOD values of the river water were in excess of 10 mg/l. Suspended solids limitations of 30 mg/l from purified sewage effluents and 100 or 120 mg/l from storm-sewage tank effluents were deemed reasonable. Effluent standards of 5 to 10 mg/l of free oil and that the content of toxic heavy metals in the receiving water shall not exceed 1 mg/l were reported. Temperature limitations from 30 to 32.5C for effluent discharges were also reported. (Galwardi-Texas)
W72-11106

STORM-WATER RETENTION CAN WORK,
Detroit Metro Water Dept., Mich.
For primary bibliographic entry see Field 05D.
W72-11110

FIELD STUDIES OF ARTIFICIAL AERATION USING A DOWNFLOW TUBE CONTACTOR,
Tufts Univ., Medford, Mass.
J. J. McKeown, G. W. Gove, and A. H. Benedict.
Proceedings, Industrial Waste Conference, 25th, May 7-9, 1970, p 865-884, 20 fig, 2 tab, 14 ref.

Descriptors: *Dissolved oxygen, *Aeration, *Artificial use, *Oxygen, *Transfer, Temperature, Depth, Mixing, Flow characteristics, Velocity, Ponds, Efficiencies, Performance, Oxygen requirements, On-site investigations.
Identifiers: Downflow bubble tube contactor, Surface aerators, Penstocks.

The effects of artificial aeration on a 60 ft. deep pond formed by a power dam using a downflow tube contractor were investigated. The contractor pumped surface waters into contact with air and discharged the air/water mixture at various depths below the pond surface. Downflow tubes having lengths of 10, 20 and 40 ft. were used. The experimental contactor consisted of an axial flow pump which delivered 4,850 gpm at a total dynamic head of 7.7 ft. Power consumption was 14.2 hp. Surveys which were conducted to define the zone of influence of the contactor utilized the determination of temperature and dissolved oxygen with depth at sampling locations in the pond surrounding the contactor. Also, velocity and direction of flow measurements were made in the pond using a directional rotor current meter. Mixing characteristic, recycle effects, changes in pond dissolved oxygen and surface bubble patterns were noted for a two month period. The influence of nearby surface aerators and the powerhouse penstocks was also noted. Results from oxygen transfer computations were arranged in tabular form. The downflow bubble contactor was capable of providing D. O. concentration levels of 5 to 8 mg/l in water having initial D. O. levels of 0 to 4 mg/l. It also has the capability of discharging near the bottom of lakes, which may be desirable in certain cases. Oxygen transfer was observed to be 1.1 to 1.4 lbs O2/hp-hr in the downflow tube. (Galwardi-Texas)
W72-11112

APPARATUS FOR COLLECTING WASTE FROM THE SURFACE OF A BODY OF WATER,
J. F. Walton.
U. S. Patent No. 3,656,624, 4 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 3, p 884, April 18, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Flotsam, Pollution abatement, Separation techniques, Water pollution treatment, Water pollution, Equipment, Waste treatment.

This invention consists of a waste collecting vessel which includes an impeller assembly. The assembly comprises a cylindrical support and flexible, circumferentially supported blades. Blades are detachable and may be folded when the support is rotated. There is a skimmer plate for engaging the blades when the support is rotated in the other direction. A pipeline system is used to remove material from the deep well of the tank. (Sinha-OEIS)
W72-11135

LIQUID SEPARATION APPARATUS,
Underwater Storage, Inc., Washington, D.C. (assignee).
H. G. Quase.
U. S. Patent No. 3,656,623, 4 p, 8 fig, 5 ref; Official Gazette of the United States Patent Office, Vol. 897, No 3, p 884, April 18, 1972.

Descriptors: *Patents, *Flotsam, *Oil spills, *Oil pollution, Separation techniques, Water pollution treatment, Pollution abatement, Water pollution, *Liquid wastes, Equipment.

The liquid separation apparatus comprises a floating platform designed for use in cleaning any body of water. Polluted water is drawn into separation tanks. Screens prevent the outflow of the waste. The main separation tanks have liquid level control devices. These provide a constant ballast and hence constant submergence of the platform. Skimmer devices may be included within the separation tanks to remove and hold collected oil. (Sinha-OEIS)
W72-11136

APPARATUS AND METHOD FOR REMOVING FLOATING POLLUTANTS FROM A BODY OF WATER,
D. J. Ryan, W. P. Ledet, and J. R. Colvin.
U. S. Patent No. 3,656,619, 4 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol. 897, No. 3, p 883, April 18, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution, Water pollution treatment, Pollution abatement, Equipment, Separation techniques, Flotsam.

This apparatus is adapted to move along in a body of water and pick up oil or other floating pollutants on the surface of the water. It comprises a hull with an inlet opening in one wall. Separator units are arranged for receiving the liquid. These are conventional centrifugal separators. Water separated from the mixture passes into a water compartment which has a tubular discharge pipe. The flow through the pipe is increased by reduced pressure at the rear of the hull due to the movement of the vessel to thereby increase the flow of the liquid through the separator units. (Sinha-OEIS)
W72-11137

RADIATION TREATMENT OF MINE WASTE WATERS,
Atomic Energy Commission, Washington, D.C. (assignee).
For primary bibliographic entry see Field 05D.
W72-11145

APPARATUS FOR REMOVAL OF OIL FLOATING ON WATER OR THE LIKE,
Gulf Research and Development Co., Pittsburgh, Pa.
R. C. Amero, and G. I. Karner.
U. S. Patent No 3,534,859, 3 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office Vol 879, No 3, p 790, October 20, 1970.

Descriptors: *Patents, *Oil spills, *Oil pollution, Pollution abatement, Equipment, Separation techniques, Water pollution, Water pollution treatment.

The apparatus comprises an inner flotation member, an outer member surrounding it and a device for joining them. These float with the uppermost portion of the inner flotation member at a predetermined level with respect to the interface between the water and the liquid floating on it. A collection vessel extends downward from the inner member and has a means to transport the liquid into the vessel away from the apparatus. (Sinha-OEIS)
W72-11154

POLLUTION CONTROL DEVICE,
J. W. Harrington.
U. S. Patent No 3,534,858, 3 p, 8 fig, 2 ref; Official Gazette of the United States Patent Office Vol 879, No 3, p 790, October 20, 1970.

Descriptors: *Patents, *Oil spills, *Oil pollution, Separation techniques, Water pollution, Water pollution techniques, Pollution abatement, Waves (Water), Ocean waves.

This invention comprises a flexible suction hose connected with a suitable vacuum source and a floatable skimmer. These are able to move with the varying wave motions so that suction apertures in the skimmer are maintained within the layer of the pollutant. A bed comprising headers connected with a manifold to a common suction pump is utilized. Individual suction lines are tied together so as to allow freedom of movement by the individual units. These function as a sweeping unit to cover a large area. (Sinha-OEIS)
W72-11155

VALVE ASSEMBLY AND SELF-CLEANSING BRINE WELL SCREEN,
R. E. Marsh.
U. S. Patent No 3,534,856, 5 p, 5 fig, 11 ref; Official Gazette of the United States Patent Office Vol 879, No 3, p 789, October 20, 1970.

Descriptors: *Patents, *Water softening, Equipment, Demineralization, Water treatment, Brine, Saline water.

This invention provides for a water conditioner brine supply assembly and screening member for the valve thereof. The assembly includes a brine tank, a cylindrical, ported, brine well mounted in a tank, and a valve. The valve is mounted within the well by a support which screens solid particles from liquids passing from the tank into the well and into the valve. (Sinha-OEIS)
W72-11158

METHOD AND APPARATUS FOR RECOVERING IMPURITIES FROM THE SURFACE OF A LIQUID,
Tetradyne Corp., Dallas, Tex.
F. N. Mueller.
U. S. Patent No 3,659,713, 4 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 898, No 1, p 117, May 2, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Flotsam, Pollution abatement, Water pollution control, Water pollution treatment, Equipment, Separation techniques.
Identifiers: *Booms.

The vessel used in this invention has a pair of elongated booms which extend forward and outward. Each boom extends above the water and carries nozzles which emit a continuous elongated gaseous stream. The floating impurities are forced to concentrate between the booms where special inlets are provided for their collecting. (Sinha-OEIS)
W72-11160

UNDERWATER OIL LEAKAGE COLLECTING APPARATUS,
T. O. Blair.
U. S. Patent No 3,658,181, 3 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 897, No 4, p 1251, April 25, 1972.

Descriptors: *Patents, *Oil pollution, *Leakage, Drilling, Oil fields, Water pollution control, Water pollution treatment, Equipment, Pollution abatement, Separation techniques.

Perforate cones are disposed at spaced intervals along an elongated core extending downward from a collecting chamber. The lowermost cone is placed over the underwater source of leakage. The oil is directed upward in a column about the core for collection in the chamber adjacent to the surface of the water. (Sinha-OEIS)
W72-11162

POLLUTION CONTROL DEVICE,
J. E. Turbeville.
U. S. Patent No 3,657,119, 4 p, 10 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 897, No 3, p 995, April 18, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Pollution abatement, Separation techniques, Water pollution treatment, Water pollution control, Oil wastes.

Water resistant ferromagnetic particles are distributed over the oil spill. The buoyant particles adhere to the oil. A magnetic field generated by a magnetic net or parallel series of magnetic grids is then applied to collect the oil coated particles from the surface of the water. (Sinha-OEIS)
W72-11163

APPARATUS FOR REMOVING OIL FLOATING ON WATER,
Stackpole Carbon Co., St. Mary's, Pa.
A. J. Shaler, and W. E. Clancy.
U. S. Patent No 3,659,715, 3 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 898, No 1, p 117, May 2, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Burning, Pollution abatement, Water pollution, Water pollution treatment, Separation techniques.

An elongated porous device is impregnated with a combustible fluid and floated in an upright position to an area of an oil slick. The upper portion extends above the water line. The upper portion is ignited to produce a flame. The fire is fed by the combustible fluid moving up by capillary action. The oil (combustible fluid) is gradually burned up. (Sinha-OEIS)
W72-11166

THE ENERGY-ENVIRONMENT CONFLICT: SITING ELECTRIC POWER FACILITIES,
Virginia Univ., Charlottesville. School of Law.
For primary bibliographic entry see Field 06G.
W72-11172

FORT SCOTT LAKE, MARMATON RIVER, KANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W72-11180

A LEGISLATOR'S VIEW OF IMPENDING AMENDMENTS TO THE WATER POLLUTION CONTROL ACT,
Congress, Washington, D.C.; and Senate, Washington, D.C.
E. S. Muskie.
Boston College Industrial and Commercial Law Review, Vol. 13, p. 629-631 (1972). 3 p.

Descriptors: *Federal Water Pollution Control Act, *Legislation, *Water quality control, *Water pollution control, Water law, Legal aspects, Water policy, Regulation, Administration, Law enforcement, Water pollution, Pollution abatement, Water quality, Water resources, Research and development.

The Senate has approved a bill amending the Federal Water Pollution Control Act and the House is considering a very similar bill. The Senate bill is designed to correct certain flaws in the Water Pollution Control Act and will provide an explicit policy objective absent in the original Act. All aspects of water pollution control--research, planning programs, construction and regulation--are directed towards this overall policy objective. The absence of a policy objective allowed various states and the federal administrative agency to develop differing interpretations of the existing law's requirements, which consequently assisted in frustrating pollution control efforts. The existing law also has proved to be unsatisfactory in its regulatory procedures by providing ways for polluters to avoid or mitigate compliance with control measures. Another defect in the existing law is that it requires the government to prove a cause-and-effect relationship between the violation of an ambient water quality standard and a particular source of discharge. The senate bill establishes a new concept of control to correct this defect. The senate bill provides a better set of tools to manage our activities within the environment. (Brackins-Florida)
W72-11185

PHOSPHATES AND PHOSPHATE SUBSTITUTES IN DETERGENTS (PART 2).
Committee on Government Operations (U.S. House).
For primary bibliographic entry see Field 05C.
W72-11186

PUGET SOUND OCEANOGRAPHIC RESOURCES.
Committee on Commerce (U.S. Senate). Subcommittee on Oceans and Atmosphere.
For primary bibliographic entry see Field 06G.
W72-11187

LAND AND WATER POLLUTION FROM RECREATIONAL USE.
National Industrial Pollution Control Council, Washington, D.C.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $0.25. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price 25 cents. National Industrial Pollution Control Council--Sub-Council Report, December 1971. 24 p, 8 photo.

Descriptors: *Water quality control, *Environmental effects, *Recreation, *Land development, Land managment, Land use, Boating, Camping, Water skiing, Water sports, Multiple-purpose projects, National parks, Recreation demand, Recreation wastes, Social aspects, Water pollution sources, Boats, Urbanization, Urban sociology, Waste treatment, Long-term planning.

No industry has so large a stake in clean water as the outdoor recreation industry. The Nation has about 186 million acres of primary recreation land over 85% of which is publicly owned. However, water recreation activities tend to take place in concentrated areas surrounding larger cities. This has a profound impact upon water quality. Some possible points for action include increased emphasis by recreational equipment manufacturers to reduce the pollution caused by their products, educational campaigns and biodegradable packaging by manufacturers of non-polluting recreational products, and general public education on water quality preservation. The leisure sub-council recommends manufacturers continue to minimize product pollution, outdoor recreational education continue, establishment of a federal demonstration project area for sound environmental practices, and distribution of a self-help analysis forum to trade associations to aid in pollution identification. Some of the questions raised by sub-council members include the setting aside of unspoiled and virgin land, the setting aside of urban land for recreational uses, and the need for federal land planning. (Grant-Florida)
W72-11188

ENVIRONMENTAL ACTIVISM: THERMAL POLLUTION--AEC AND STATE JURISDICTIONAL CONSIDERATIONS.
State Univ., of New York, Buffalo.
R. I. Reis.
Boston College Industrial and Commercial Law Review, Vol. 13, p. 633-684 (1972). 204 ref, 1 append.

Descriptors: *Thermal pollution, *Administrative decisions, *Environmental effects, *Water pollution sources, Regulation, Administrative agencies, Judicial decisions, Decision making, Heat water, Water pollution, Radioactive wastes, Radioactive waste disposal, Nuclear energy, Nuclear power-plants, State governments, Federal government, Legal aspects, Permits, Legislation, Water quality, Water quality standards.
Identifiers: *Atomic Energy Commission, *National Environmental Policy Act.

Prior to 1971 environmental effects of operation and construction of nuclear power facilities were given only limited attention due to judicial restraint and reluctance of the Atomic Energy Commission to consider questions of the non-radiological environmental harm and thermal pollution. Following litigation based on the National Environmental Policy Act, the Commission was forced to issue revised regulations in September 1971. Although providing for full environmental review the rules left the Commission with the discretion to determine whether a project would have a significant effect on the environment. The availability of judicial remedies does not appear to offer the requisite environmental protection to compensate for the Commission's abstention from complete environmental jurisdiction. Hence it might be beneficial to subject the Commission to review by the Council on Environmental Quality. Perhaps most significant in the Commission's environmental decision making will be the watchdog role played by environmental interest groups. A review of the technological and ecological problems surrounding thermal pollution is included. (Brackins-Florida)
W72-11193

SFI DIRECTORS RESOLUTIONS--WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, TEMPORARY EXEMPTION OF EPA FROM ISSUANCE OF ENVIRONMENTAL IMPACT STATEMENTS AND NATIONAL ENVIRONMENTAL RESEARCH CENTER.

Sport Fishing Institute Bulletin, No. 235, p. 1-2, Washington, D.C., June 1972.

Descriptors: *Legislation, *Water quality control, *Water pollution control, *Environmental control, Federal Water Pollution Control Act, Thermal pollution, Pollution abatement, Research and development, Federal government, Water pollution, Legal aspects, Effluents, Waste disposal, Water quality, Water Quality Act, Permits, Water law.

The Board of Directors of the Sport Fishing Institute adopted several resolutions dealing with environmental legislation at their May 1972 meeting. The Board urges the Congressional Conference Committee on the Federal Water Pollution Control Act Amendments of 1972 to set aside partisan differences and enact a new law promptly. The Senate version is favored by the Board. The Board objected to the House version which would exempt thermal discharges from provisions of the Water Quality Act of 1965. The Board urges support of a House bill which would exempt the effluent discharge permit issuance program of the Environmental Protection Agency from the environmental impact statement requirements imposed by the National Environmental Policy Act. The exemption would be temporary and only for that specific program in order to avoid delay in its implementation. The Board also endorses the establishment of a National Environmental Research Center to be administered by the Environmental Protection Agency and directed to undertake investigations into the effects of man's alterations of the environment. (Brackins-Florida)
W72-11196

ENVIRONMENTAL LAW--NATIONAL ENVIRONMENTAL POLICY ACT OF 1969--PROCEDURAL REQUIREMENTS OF THE ACT MUST BE FOLLOWED IN GOOD FAITH--CALVERT CLIFFS' COORDINATING COMMITTEE, INC. V. ATOMIC ENERGY COMMISSION,
For primary bibliographic entry see Field 06E.
W72-11197

LOCAL WARS ON POLLUTION.
U.S. News and World Report, February 9, 1970. p. 22-25, 4 p, 9 photo.

Descriptors: *Pollution abatement, *Pollutants, *Environmental effects, *Waste treatment, Water pollution control, Water quality standards, Water pollution, Economics, Legal aspects, Government finance, Governmental interrelations, Local governments, State governments, Federal government, Air pollution, Air pollution effects, Radioactive wastes, Nuclear power plants, Water pollution sources.

Citizen groups are using different methods to wage the local wars against pollution. Citizen actions to fight pollution include the cleanup of Los Angeles Harbor through revised standards for water quality, stringent guidelines for development of the San Francisco Bay shoreline, and litigation to stop radioactive discharge into waters by a nuclear plant at Calvert Cliffs, Md. Interior Secretary Hickel will implement the President's proposed clean-waters program by setting up guidelines for solving the water-pollution problem. State and local governments will then plan for their needs within these guidelines. Once these federal guidelines have been satisfied, the federal government will agree to pay capital costs of pollution abatement projects over a period of 30 years. (Ilkson-Florida)
W72-11198

ENVIRONMENT REPORT/EPA AND JUSTICE DEPARTMENT CLASH OVER ANTI-POLLUTION ENFORCEMENT,
R. S. Frank.
National Journal, Vol. 3, p. 2048-2053 (1971). 6 p, 4 photo.

Descriptors: *Rivers and Harbors Act, *Penalties (Legal), *Pollution abatement, *Federal government, *Governmental interrelations, Administration, Legal aspects, legislation, Federal jurisdiction, State jurisdiction, State governments, Regulation, Permits, Air pollution, Water pollution, Judicial decisions, Law enforcement.

Differences exist between the federal government's lawyers and its environmental specialists as to whether and when to use their legal tools to halt pollution and punish polluters. The Justice Department seeks to take polluters to court while the Environmental Protection Agency (EPA) believes that other means are more effective in ending pollution. The rediscovery of the Refuse Act has allowed increased criminal prosecutions by requir-

ing federal permits to discharge into the nation's waterways. The Jutice Department wants more suits to be brought and more actions of citizen's complaints. EPA is less eager to go to court and believes a more systematic approach to pollution abatement is needed. EPA seeks voluntary compliance which is the object of any regulatory program. EPA perfers to take only major polluters to court because about 10 per cent of the polluters cause about 90 per cent of the pollution. The Justice Department is attempting to increase suits by making exceptions to the requirement that complaints by citizens be referred to EPA. New federal air and water quality bills may increase the number of cases the government brings to court, but that will depend on what is settled between the EPA and the Justice Department. (Nielsen-Florida)
W72-11199

RESCUING THE ENVIRONMENT--THE PRESIDENT'S PROGRAM.
U. S. News and World Report, p. 93-97, February 23, 1970. 5 p.

Descriptors: *Water pollution control, *Water pollution sources, *Industrial wastes, *Municipal wastes, *Chemical wastes, Agricultural chemicals, Water pollution treatment, Water quality control, Water quality standards, Navigable waters, Economics, Legal aspects, Penalties (Legal), Effluents, Pesticides, Governments, Administration, Legislation, Waste treatment, Law enforcement, Industries, Pollutants.

The President outlines his comprehensive program to deal with pollution. Water pollution has three principal sources: municipal, industrial and agricultural wastes. The most troublesome to control are those from agricultural sources: animal wastes, eroded soil, fertilizers and pesticides. Intensified research is needed to develop new methods of reducing agricultural pollution while maintaining productivity. Federal funding is needed to provide means with which cities can build municipal waste treatment plants. To meet the goal of erecting secondary waste treatment plants three proposals are set forth: Authorization of 4 billion dollars to be allocated on a matching fund basis, establishment of an Environmental Financing Authority to finance waste treatment plants, and giving priority to those areas where facilities are most needed. The President proposes a seven point program to deal with industrial pollution. This program will consist of precise effluent standards, making violation of standards illegal, giving the Secretary of the Interior powers to proceed swiftly in enforcement actions, imposing fines up to $10,000 per day for violating water quality standards, authorizing Secretary of the Interior to seek immediate injunctive relief in emergencies, extending the federal program to all navigable waters, and enlarging the funding of pollution control enforcement agencies. The President proposes the establishment of a National Industrial Pollution Control Council to mobilize industry's resources to fight pollution. (Ilkson-Florida)
W72-11200

NATO EXPERTS RECOMMEND INTERNATIONAL ACTION ON OCEAN OIL SPILLS,
Department of Transportation, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11203

THE USE OF 'DOFILTR', A MASS COMPOUND, FOR MANGANESE AND ACID REMOVAL FROM DEEP FLOWING IRON--FREE WATER,
Polish Association of Sanitary Engineering and Technology, Warsaw (Poland).
F. Ewertowski, and W. Ewertowska.
Gaz Woda Tech Sani. Vol 44, No 11, p 375-377. 1970.

Identifiers: *Acidic water, Acids, Calcium, Carbon, Carbonates, Corrosion control, Dofiltr, Equilibrium, Hardness (Water), Iron-free water, *Manganese, Minerals, Oxides, *Water purification.

The use of 'dofiltr' for removal of manganese (Mn) from deep flowing iron-free water or from which iron has been removed by adsorption, gives good results. Filters of 'dofiltr' can be used for very soft and medium hard water with high Mn content. The rate of filtration must be experimentally determined and depends upon several factors, but can be fairly rapid due to the high activity of 'dofiltr.' The compound binds mineral acids and CO2 at high filtration rates. There is a correlation between adsorbed CO2 and water hardness. On the basis of analysis one can select a suitable rate of filtration at which the water will lose its corrosive properties and at the proper pH will be in a state of CO3Ca equilibrium.--Copyright 1972, Biological Abstracts, Inc.
W72-11214

MODELING PROBLEMS AND PROBLEM AVOIDANCE IN WATER RESOURCE MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Graduate School of Business and Public Administration.
For primary bibliographic entry see Field 06A.
W72-11225

DECOMPOSITION AND MULTILEVEL TECHNIQUES FOR WATER QUALITY CONTROL,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
Y. Y. Haimes.
Water Resources Research, Vol. 8, No. 3, p 779-784, June, 1972. 1 fig, 1 tab, 14 ref.

Descriptors: *Water quality control, *Water pollution control, *Model studies, Optimization, Effluents, Waste water treatment, Pollution abatement, Taxes, Computers, Comparative benefits, Dissolved oxygen, Biochemical oxygen demand, *Pollution taxes (Charges).
Identifiers: *Effluent charges, Modeling techniques, Miami River.

Discussed are the advantages of a system of effluent charges to control water quality and abate pollution. The imposition of a tax would tend to encourage plants to make changes that in many cases reduce the volume of effluents, as well as the water intake. Therefore, the economic incentive not to pollute would be very strong, and the responsibility for pollution control would be assigned to those who are responsible for the pollution. A decomposition and multilevel optimization approach that is capable of handling large-scale and complex nonlinear systems is reported to be successfully applied to problems of water quality control, and a related simple example is presented to demonstrate the methodology of the multilevel approach. The concept of this approach is based on the decomposing of large-scale systems and the subsequent modeling of the system into independent subsystems. Advantages over conventional methods of solving complex optimization problems are enumerated. For example, conceptual simplification is achieved, and the computational effort involved is reduced. A summary of computational experience in comparing the multilevel approach with the Dantzig-Wolfe and quadratic programming methods as applied to the Miami River data is given. (Bell-Cornell)
W72-11226

ILLINOIS V. CITY OF MILWAUKEE, WISCONSIN (POLLUTION OF INTERSTATE WATERS INVOLVES FEDERAL QUESTION UNDER FEDERAL COMMON LAW).
For primary bibliographic entry see Field 06E.
W72-11259

SUPERVISOR OF THE HARBOR PERMIT PROGRAM FOR WASTE DISPOSAL IN THE ATLANTIC OCEAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from the National Technical Information Service as PB-204 264D, $3.00 in paper copy, $0.95 in microfiche. November 2, 1971. 30 p, 1 fig, 4 tab.

Descriptors: *New York, *Permits, *Environmental effects, *Waste disposal, *Waste dumps, Sludge disposal, Industrial wastes, Chemical wastes, Aquatic environment, Regulation, Sewage sludge, Sludge, Oxygen demand, Chemical oxygen demand, Project purposes, Project benefits, Oceans, Atlantic Ocean, Water pollution, Water quality, Recreation, Toxicity, Eutrophication, Sediments.
Identifiers: *Environmental Impact Statements.

The action involves the continuation of the permit program under which permits are issued for the disposal of various types of wastes at designated dumping grounds in Outer New York Harbor. The continuation of this disposal method will have an adverse impact on water quality as a result of the dumping of spoil deposits, sewage wastes, wrecked vessels and chemical wastes. The New York Harbor status, as one of the more intensely polluted water areas of the nation, renders it difficult to evaluate the relative effects of the individual pollution sources, such as wastes dumped under the permit program. The pollution will adversely affect recreation, marine life and the regional economy. Alternatives consist of either cessation of the permit issuance program or alternate dump sites. Alternatives for sewage sludge, dredge spoils, and industrial wastes, are included in separate tables listing alternatives, beneficial impacts, detrimental impacts, and factors unfavorable for implementation. The favorable impact involves the economic benefits associated with a low cost means of waste disposal for sewage authorities, industrial processing concerns, and the construction industry. (Brackins-Florida)
W72-11265

THE RIVER BASIN MODEL: MUNICIPAL SERVICES DEPARTMENT.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11271

THE RIVER BASIN MODEL: SCHOOL DEPARTMENT.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11272

Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11273

THE RIVER BASIN MODEL: ECONOMIC SECTOR.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11274

LIMITATIONS AND EFFECTS OF WASTE DISPOSAL ON AN OCEAN SHELF.
Florida Ocean Sciences Inst., Deerfield Beach.
For primary bibliographic entry see Field 05B.
W72-11275

A HYDROLOGICAL-METAL POLLUTION STUDY, HEATH STEELE MINES AREA, NEW BRUNSWICK, CANADA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05B.
W72-11300

ON THE EXPERIMENT ON DESTRATIFICATION OF RESERVOIR WATER BY AIR--BUBBLING, (SECOND REPORT), (IN JAPANESE),
T. Arai.
Misc Rep Res Inst Nat Resour. Vol 75 p 50-60. 1971. Illus. Map. (Engl. summ.).
Identifiers: Air bubbling, *Destratification, *Water treatment, Reservoirs.

The need for further studies on destratification methods is indicated in view of the unsatisfactory results obtained by the air-bubbling method under Japanese conditions.--Copyright 1972, Biological Abstracts, Inc.
W72-11326

WATER RESOURCE PROJECTS AND ENVIRONMENTAL IMPACTS: TOWARDS A CONCEPTUAL MODEL,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 06B.
W72-11385

THE DESIGN OF A CONTINUOUS FLOW BIOLOGICAL EARLY WARNING SYSTEM FOR INDUSTRIAL USE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
J. Cairns, Jr., R. E. Sparks, and W. T. Waller.
Paper presented at the 27th Purdue Industrial Waste Conference, May 2-4, 1972, at Purdue University, 21 p, 6 tab, 7 fig. OWRR A-039-VA (1).

Descriptors: *Monitoring, Fish behavior, *Industrial wastes, *Water pollution control, Toxicity, Water quality, Water pollution effects.
Identifiers: Biological monitoring, In-plant monitoring, Fish respiration.

All ecosystems should be managed on a regional basis. Proper management will insure that benefits are optimized and that each system serves a variety of uses. Management of aquatic ecosystems requires a clear understanding of the goals to be achieved, appropriate information and the means to achieve the goals. Control measures applied to aquatic ecosystems, in the absence of information on the condition of the system, are apt to be inappropriate and thus may overprotect the receiving system at times and underprotect it at other times since the ability of ecosystems to receive wastes is not constant. A major determinant of the effectiveness and efficiency of ecological quality control is the lag time in the feedback of information. If the lag is too great, the control measures may repeatedly overshoot or undershoot the desired goal. Present techniques for measuring the responses of aquatic organisms and communities require days or weeks, whereas information for ecosystem quality control and prevention of ecological crises should be generated in minutes or hours as is the case for other quality control systems. A biological monitoring system has been developed to generate information rapidly. The system measures changes in the movement and breathing of fish in order to provide an early warning of developing toxicity in the wastes of an industrial plant.
W72-11393

ATTITUDE OF US PUBLIC HEALTH SERVICE IN DEVELOPMENT OF DRINKING WATER STANDARDS, 1961,
Public Health Service, Washington, D.C. Div. of Water Supply and Pollution Control.
O. C. Hopkins.
Journal of the American Water Works Association, Vol. 53, No. 8, p. 946-950, August 1961, 2 ref.

Descriptors: *Standards, *Water quality standards, Water management (Applied), *Public health, *Potable water, Regulation.
Identifiers: Quality limits, Quality safety.

Domestic water supplies should protect the health and promote the well-being of individuals and of the community. Proposed standards are minimum requirements for reaching this goal. Minimum requirements should be based in part on compliance with good practices so as not to encourage any unnecessary contamination of drinking water. In many areas, it will be necessary to use and reuse the same water, and to maintain quality as well as quantity. Good management and qualified operators are essential for a good product. (Britton-AWWARF)
W72-11394

WATER QUALITY STANDARDS,
R. L. Derby, O. C. Hopkins, O. Gullans, J. R. Baylis, and E. L. Bean.
Journal of the American Water Works Association, Vol. 52, No. 9, p. 1159-1188, September 1960. 4 tab, 72 ref.

Descriptors: *Standards, *Water management (Applied), Water quality control, Water analysis, Water supply systems, *Potable water, *Water quality standards.

A symposium at the 1960 Annual Conference of the American Water Works Association, Bal Harbour, Florida produced a group of papers on the value, use and development of water quality standards. Standards have played a major role in the detection and control of pollution and at the present time very few cities have records of recent serious illness traceable to their water supplies. New USPHS standards are discussed including the original requirements, source and protection aspects, bacteriologic quality, physical characteristics, radiologic quality, chemical characteristics, proposed changes, and new substances. From the Operator's viewpoint, turbidity measurements, the need for high-grade employees, the need for research, employee-training courses, promotion and salary, unfiltered surface water, and the practical value of USPHS limits are described. Rating systems, industrial and domestic needs, point of applicability, functional aims of standards and legal aspects of enforcing the standards also are discussed. (Britton-AWWARF)
W72-11396

TOXICOLOGIC METHODS FOR ESTABLISHING DRINKING WATER STANDARDS,
Robert A. Taft Sanitary Engineering Center, Cincinnatti, Ohio.
H. E. Stokinger, and R. L. Woodward.
Journal of the American Water Works Association, Vol. 50, No. 4, p. 515-529, April 1958. 6 tab, 10 ref.

Descriptors: *Toxicity, *Toxins, *Standards, Water quality control, Test procedures, Water management (Applied), Pesticides, *Potable water, *Water quality standards, Lethal limit.
Identifiers: *Threshold limits, *Toxicologic classification.

A rather large background of toxicologic information and practical health safety limits are used in other fields and may be advantageously used in the development of drinking water standards. Aspects discussed are the safe limits of toxic substances in the air of industrial environments, toxicologic information on which pesticide residue tolerances for foods are based, toxicologic information developed from nutritional studies, and toxicity classifications based on chemical structure relationships. A variety of modifying factors must be applied in developing a standard for water. Major factors are the difference of susceptibility of the very yound, the aged, and debilitated individuals; carcinogenic agents; and the possible modification of toxic response as a result of combinations of substances. (Britton-AWWARF)
W72-11397

TURBIDITY MEASUREMENT,
Florida State Game Freshwater Fish Commission, Eustis.
For primary bibliographic entry see Field 02J.
W72-11432

WATER MEASUREMENTS OF COASTAL LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 02L.
W72-11446

GROUND-WATER INVESTIGATIONS IN OKLAHOMA,
Geological Survey, Oklahoma City. Water Resources Div.
For primary bibliographic entry see Field 02F.
W72-11448

THE AQUEOUS UNDERGROUND,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W72-11466

FEASIBILITY OF UTILITY TUNNELS,
Chicago City Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 03D.
W72-11474

REGIONAL SEWERAGE PLAN FOR AN 11,000--SQUARE-MILE AREA,
Camp, Dresser and McKee, Inc., Boston, Mass.
C. A. Parthum.
Public Works, Vol 103, No 2, p 44-45, February 1972. 2 fig.

Descriptors: *Regional development, *Sewerage, *Long-term planning, *City planning, Consolidation, Economics, Administration, Water quality control, Water supply, Water reuse, Reclaimed water, *Texas.
Identifiers: *Upper Trinity River Basin, *Regional planning, Centralization.

A comprehensive sewerage plan for the Upper Trinity River Basin in North Central Texas, comprised of the metropolitan area of Dallas-Fort Worth and several surrounding counties, has won widespread support by agencies at all governmental levels. The major recommendation of a two-year study is consolidation of 53 existing waste water treatment plants in the Dallas-Fort Worth metropolitan center into a regional system of six jointly operated plants. A $50 million program of treatment facility improvements is recommended for other communities in the study area, outside the metropolitan area of the two large cities. For reasons of sound economics, centralization of responsibility, and administration of construction, operation and maintenance, the engineering team recommended limited consolidation of the large number of sewage treatment plants scattered throughout the metropolitan area into six joint systems, requiring modification and enlargement of six existing treatment plants. To obtain adequate control of pollution in the Upper Trinity River Basin, the consultants recommend that adequate collection and treatment of domestic and industrial waste water be augmented by centralization of efforts aimed at controlling all types of water pollution, including runoff from agricultural lands and leachate from solid waste disposal sites. As population and water consumption in the area increase, the surplus supply of water in the basin will decrease to the point where waste water reuse will be imperative. The study predicts that after 1990, water for domestic uses may have to be supplemented by reclaimed waste water. (Strachan-Chicago)
W72-11476

ACTION NOW - A VIEW FROM CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 05F.
W72-11477

THE PUGET SOUND SULPHITE PULP MILLS AND THE TRAGEDY OF THE COMMONS,
Western Washington State Coll., Bellingham. Dept. of Biology.
R. W. Fonda.
Biological Conservation, Vol 4, No 1, p 31-38, October 1971. 4 tab, 3 fig, 4 ref.

Descriptors: *Pulp and paper industry, *Pulp wastes, *Pollution abatement, *Water quality control, Research and development, Feasibility.
Identifiers: *Puget Sound, *Mutual coercion, Discharge permit.

Garrett Hardin's thesis of mutual coercion, mutually agreed upon by the majority of the people affected, is well-founded, and represents a feasible approach to pollution control. Eight pulp-mills discharging waste into Puget Sound were the objects of four years of research into the biological impact of pulping wastes. A Federal-State Conference proposed recommendations that have been incorporated into discharge permits to stop biologically harmful waste discharge into Puget Sound. All mills were treated equally in the process, and all must meet the same effective level of biologically adequate waste discharge. Mutual coercion of this type was the only solution to the problem. Left to themselves, it is doubtful whether the mills would have made an effort to intercept wastes. (Strachan-Chicago)
W72-11478

A NATIONAL SEASHORE PROVES A MIXED BLESSING FOR ITS SURROUNDING COUNTY,
Marshall Kaplan, Gans and Kahn, Sausalito, Calif.
For primary bibliographic entry see Field 06G.
W72-11481

APPLICATIONS OF ECOSYSTEM THEORY, SUCCESSION, DIVERSITY, STABILITY, STRESS AND CONSERVATION,
Toronto Univ., (Ontario); and British Petroleum Co., Ltd., London (England).
For primary bibliographic entry see Field 06G.
W72-11486

SOLVING THE COMBINED SEWER OVERFLOW PROBLEM OF A MAJOR CITY,
Weston (Roy F.), Inc., Westchester, Pa.
R. F. Weston, J. E. Germain, and M. E. Fiore.
Public Works, Vol 103, No 5, p 106-108, May 1972. 1 tab, 2 fig, 2 ref.

Descriptors: *Sewers, *Overflow, *City planning, *Water pollution control, *Combined sewers, Alternative planning, Costs, Benefits.
Identifiers: *Metropolitan water resources management, *Washington, D.C., Combined storage and treatment.

Most major cities in the United States are facing serious pollution control problems associated with overflows from combined sewerage systems. In Washington, D. C., Roy F. Weston, Inc. under the auspices of the Office of Research and Monitoring of the Federal Environmental Protection Agency undertook a study to discover a more timely and lower cost solution to the problem of overflows. The primary objectives of the study were: to define the magnitude of combined sewer overflows in the District, to investigate the feasibility of high rate filtration for treatment of combined sewer overflows, and to develop alternative solutions to the problem. Sewer separation, storage in reservoirs, storage and treatment at each overflow point, and storage in tunnels and mined storage facilities were all methods of overflow control which warranted detailed investigation. The study showed that combined sewer overflows will provide better stream protection at lower cost and with more incidental benefits than sewer separation or any other currently available alternative. (Strachan-Chicago)
W72-11488

WATER QUALITY: A QUESTION OF STANDARDS,
Washington Univ., Seattle. Dept. of Geography.
For primary bibliographic entry see Field 06E.
W72-11496

ECONOMIC GROWTH AND THE NATURAL ENVIRONMENT,
California Univ., Riverside.
R. C. d'Arge.
In: Environmental Quality Analysis, Papers from a Resources for the Future Conference, The Johns Hopkins Press, 1972. p 11-34. 1 fig, 21 ref.

Descriptors: *Economics, *Environment, *Resources development, *Wastes, Planning, Regulation, Population.
Identifiers: *Paradigms, *Conjunctive utilization, Policy making, Consumption.

A series of highly simplified paradigms are developed which relate the economy to the natural environment in terms of resource extraction and waste emissions. Conjunctive utilization of the environment is briefly analyzed. It is argued that the hypothetical economy could achieve an optimum path of consumption and period of survival only by imposing regulations on both extraction of natural resources and waste disposal that reflected the natural environment's presumed finite waste-holding capacity and the availability of extractive resources. A rational environmental policy cannot be piecemeal or independent. A truly optimal extraction and waste accumulation program must be considered concurrently with a population program. Macroeconomic policy instruments have a definite and often unrecognized impact on the natural environment through their effects on rates of resource extraction and growth in consumption per capita. The processes of pollution and extraction are common characteristics of any economy. They are not separable entities to be studies in isolation without regard to their physical and biological interdependencies. Rational utilization of the natural environment requires careful planning of rates of resource extraction and pollutant emissions. In a growing economy, recycling, savings rates, and rates of technical or physical obsolescence are intimately connected to resource use and waste flows, and thus, cumulative short-term government policies may have a long-term impact on the environment. (Strachan-Chicago)
W72-11500

A QUANTITATIVE FRAMEWORK FOR RESIDUALS MANAGEMENT DECISIONS,
Resources for the Future, Inc. Washington, D.C.
C. S. Russell, and W. O. Spofford, Jr.
In: Environmental Quality Analysis, Papers from a Resources for the Future Conference, The Johns Hopkins Press, 1972. p 115-180. 8 fig, 5 tab, 100 ref.

Descriptors: *Planning, *Decision making, *Management, *Model studies, *Decision making, Regional analysis.
Identifiers: *Quantitative framework, *Residuals management, *Policy making, Regional planning.

A quantitative framework designed to assist regional authorities in making decisions about residuals management policies is described. The framework deals explicitly with air-borne, waterborne, and solid residuals and includes, in a linear programming model of regional production, information about internal production process changes, recirculation alternatives, and end-of-pipe treatment processes, and their implications for the form and amount of residual discharges. This model is useful both in identifying the kinds of information necessary for effective regional decision making and in structuring the problem of residuals management to suggest the areas in which several relevant disciplines may make important contributions. In application of the model, the following research tasks would be faced: (1) identification of at least the most significant residuals-generating industries of the region, and the study of their process changes, recirculation and treatment alternatives relevant to residuals discharges; (2) the building of necessary dispersion and diffusion models for the region; (3) the development of ecological models to parallel the physical transformation models; and (4) the estimation of damage functions for the region's receptor locations. The next major step in this research will be an effort to apply this framework to an actual region to see whether it will prove useful and practical under complicated real-world conditions. (Strachan-Chicago)
W72-11501

DISTRIBUTION OF ENVIRONMENTAL QUALITY,
Bowdoin Coll., Brunswick, Me.
A. M. Freeman, III.
In: Environmental Quality Analysis, Papers from a Resources for the Future Conference, The Johns Hopkins Press, 1972. p 243-278. 2 fig, 5 tab, 43 ref.

Descriptors: *Environment, *Distribution patterns, *Decision making, *Planning, *Economics, Benefits, Costs, Equity, Management, Political aspects, *Pollution abatement.
Identifiers: *Policy making.

Topics are: (1) what can be said now about the patterns of distribution of benefits and costs associated with environmental pollution and pollution abatement programs, (2) what can be said about the appropriate role of distribution considerations in environmental quality planning, and (3) in light of (1) and (2) research needs and priorities. It is granted that distribution does matter in public decision making regarding the environment, and that some means has been found to represent this equity concern. Equity concern can have three kinds of effects on the set of public decisions. (1) It could result in some projects being undertaken, even though their benefit-cost ratios were less than one, because the benefits were directed more toward a target group of 'deserving' beneficiaries. (2) Any project could be altered to further distributional objectives. (3) Efficiency and equity objectives may be competitive in that to achieve greater equity in the distribution of benefits (or costs) it may be necessary to incur lower total benefits (or higher costs). The most effective way to improve the general distribution of the environment is to improve the basic distribution of wealth. There is one respect in which the distribution question is ultimately unavoidable in environmental quality planning and decision making. Effective management of the environmental common property resources requires a clear delineation of property rights in the environment and the establishment of means to enforce these rights. The problem is to get the political system to come to grips with the equity implications of possible policy alternatives. (Strachan-Chicago)
W72-11502

ENVIRONMENTAL QUALITY AS A PROBLEM OF SOCIAL CHOICE,
Resources for the Future, Inc., Washington, D.C.
E. T. Haefele.
In: Environmental Quality Analysis, Papers from a Resources for the Future Conference, The Johns Hopkins Press, 1972. p 281-332. 3 fig, 49 ref, 11 tab, 2 append.

Descriptors: *Environment, *Social aspects, *Institutions, Governments, Planning, Decision making, Funding.
Identifiers: *Policy making, Implementation.

Environmental quality is viewed as a social choice problem and representative government as the

utility mechanism that has unique capabilities for aggregating individual preferences into social choices. General conclusions about the present state of institutions in the environmental field include: (1) There is a need to redress the balance between the legislative and the executive role in environmental choices at all levels of government. (2) There is a need to force environmental issues into partisan politics at every level of government. (3) There is a need to focus directly on institutional design. (4) There is a need for representative governmental structures at the regional level. (5) There is a need to remove water projects and other regional project investment concerns from Congress. If these shifts of emphasis occurred, the following situation would develop. The federal role would emphasize, on the legislative side, the questions of how much money should be appropriated for environmental purposes and what regional distribution should be made. On the executive side, it would emphasize the availability of technical expertise. The states, regions, and localities would be making environmental choices, and deciding how to allocate federally disbursed monies, what additional monies were needed, and how best to implement these decisions. (Strachan-Chicago)
W72-11503

LEGAL STRATEGIES APPLICABLE TO ENVIRONMENTAL QUALITY MANAGEMENT DECISIONS,
Michigan Univ., Ann Arbor.
J. L. Sax.
In: Environmental Quality Analysis, Papers from a Resources for the Future Conference, The Johns Hopkins Press, 1972. p 333-344. 6 ref.

Descriptors: *Legal aspects, *Decision making, *Environment, *Management, Administration, Planning, Decision making.
Identifiers: *Environmental Law, Theory, Implementation.

Lawyers should struggle with the same problems which engage economists and other professionals working with problems of environmental quality. The issue which most interests this profession is the effective translation of theory into practice. Effective implementation has begun to dominate the attention of lawyers concerned with environmental quality. Another issue of interest to lawyers is the representation of the public interest. This issue reveals: (1) the importance of participatory democracy in coping with environmental problems, and (2) the demerits of a system of government which is tightly structured along jurisdicional lines so that only certain people or agencies have authority to make certain kinds of decisions. Lawyers must fashion tools which will make the public interest into public rights. The need is for a 'market' in which there is a seller with power to restrainthe sale unless his interest is adequately compensated. Environmental lawyers are concentrating upon the development of such 'markets'. A willingness to abandon the faith traditionally placed in administrative processes is required. (Strachan-Chicago)
W72-11504

POWER STRUCTURE STUDIES AND ENVIRONMENTAL MANAGEMENT: THE STUDY OF POWERFUL URBAN PROBLEM-ORIENTED LEADERS IN NORTHEASTERN MEGALOPOLIS,
Indiana Univ., Bloomington.
D. C. Miller.
In: Environmental Quality Analysis, Papers from a Resources for the Future Conference, The Johns Hopkins Press, 1972. p 345-395. 6 fig, 1 append, 24 ref, 7 tab.

Descriptors: *Environment, *Management, *Urbanization, *Leadership, Regional development, City planning, Decision making.
Identifiers: *Power structure studies, *Northeastern Megalopolis, Metropolitan resources management.

A search was made for the most powerful urban problem-oriented leaders of Megalopolis (Boston to Washington). Responses from questionnaires sent to leaders provided data on urban problem interest and activity patterns, acquaintance and working relations of the key leaders, and some decision making mechanisms. Megalopolis is best conceptualized as a distinctive highly urbanized locale containing a network of leaders and organizations that are usually concerned with local, state, or national, but not regional, policy. The trend toward closer regional integration is clearly affirmed by a multitude of metropolitan and subregional planning agencies and a growing number of regional administrative agencies. Regional power structures within Megalopolis can be delineated by community power techniques. An embryonic power structure does exist, and there is rather high consensus about the key leaders who would have the most influence in regional planning and policy making for urban problems in Megalopolis. Immediate future research will include: (1) determination of group cohesion and cleavage of key and top business, labor, political, religion, and civic leaders, (2) analyses of urban problem activity, (3) determination of power rating of individual leader and occupational group networks, (4) establishment of profiles of ten highest key leaders by total acquaintance and contact to determine their network of communication in each city with each occupational group, and (5) establishment of profiles of ten highest key leaders by total acquaintance and contact to determine their acquaintance and contact with 26 regional nominees. (Strachan-Chicago)
W72-11505

ARKANSAS-RED RIVER BASINS WATER QUALITY CONTROL STUDY--PART I, AREAS VII, VIII AND X, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.

Available from the National Technical Information Service as PB-203 603D, $3.00 in paper copy, $0.95 in microfiche. September 8, 1971. 28 p, 2 map, 4 tab.

Descriptors: *Texas, *Brine disposal, *Water quality control, *Environmental effects, Brines, Salinity, Waste disposal, Saline water, Barriers, Irrigation water, Water quality, Reservoir storage, Water storage, Desalination plants, Subsurface drainage, Pipelines, Diversion, Dam construction.
Identifiers: *Environmental Impact Statements, *Arkansas-Red River basins.

The project would involve construction of four low-flow dams, three brine storage dams and several miles of pipeline in Cottle, Foard, King and Knox Counties, Texas. The project would control brines entering municipal water supplies and the Red River to a level acceptable for irrigation use without subsequent treatment. Construction would include four low-flow dams for collection of brine-laden waters, three brine storage dams for holding the concentrated salt solutions during evaporation, and the necessary pumps and pipelines to transport the solutions from the low-flow reservoirs to the brine storage reservoirs. Approximately 19,000 acres would be converted to public ownership. The project will provide facilities for water quality control and will significantly improve the quality of the water below the low-flow dams and downstream. The project will gradually reduce wildlife habitat as brine pools fill, while attracting moderate water fowl populations. The project will inundate grazing land causing a loss of livestock grazing area. Alternatives included diversion, desalination and subsequent injection. (Nielson-Florida)
W72-11510

BUFFALO HARBOR, NEW YORK--MAINTENANCE (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Buffalo, N.Y.
For primary bibliographic entry see Field 04A.
W72-11512

PITTSBURGH COAL CO. V. SANITARY WATER BOARD (MINEOWNER'S DUTY TO TREAT WATERS DISCHARGED INTO WATERCOURSES).
For primary bibliographic entry see Field 06G.
W72-11516

UNITED REIS HOMES V. PLANNING BOARD OF NATICK (VALIDITY OF BOARD OF HEALTH REGULATIONS CONTROLLING LOT DRAINAGE).
For primary bibliographic entry see Field 06E.
W72-11517

KALUR V. RESOR (VALIDITY OF REGULATIONS AUTHORIZING DISCHARGES INTO NAVIGABLE WATERS).
For primary bibliographic entry see Field 06E.
W72-11518

FLORIDA AIR AND WATER POLLUTION CONTROL COMMISSION V. ST. REGIS PAPER COMPANY (PROCEDURE FOR ASSESSING POLLUTION PENALTIES PURSUANT TO FLORIDA AIR AND WATER POLLUTION CONTROL ACT).
For primary bibliographic entry see Field 06E.
W72-11520

U.S. GIVES VIEWS ON CONVENING CONFERENCE ON LAW OF THE SEA,
Department of State, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11521

ENVIRONMENT IN THE COURTROOM,
Michigan Univ., Ann Arbor. School of Law.
J. L. Sax.
Saturday Review, Vol. 53, p. 55-57, October 3, 1970. 1 photo, 2 dwg.

Descriptors: *Legal review, *Legislation, *Environmental control, *Pollution abatement, Legal aspects, Public rights, Common law, Governmental interrelations, Judicial decisions, Water law, Administration, Political aspects, Coordination, Institutional constraints, Leadership, Michigan, Administrative agencies.
Identifiers: *Public trust doctrine.

For most environmental problems there is no recognized public right to redress due to sixteenth-century public nuisance law. Yet instances like the Santa Barbara oil spill and the SST controversy have persuaded private citizens that they must obtain the right to take environmental disputes to court rather than leaving such matters solely to the discretion of public officials. The Michigan legislature has passed a bill empowering any person or organization to sue any private or public body and to obtain a court order restraining conduct that is likely to pollute, impair, or destroy the air, water, or other natural resources or the public trust therein. At least five states have passed similar bills and almost identical legislation is now pending in the Congress. Parallel development is beginning to emerge in the courts as part of the common law under the public trust concept. Yet courts serve only to supplement and invigorate the activities of administrative agencies, the legislature, and other governmental activities by making clear that there is another avenue of redress for the citizen. By requiring officials to consider alternatives, the courts help to promote broad planning. (Widman-Florida)
W72-11522

POLLUTION POLITICS.

The New Republic, p. 5-6, October 31, 1970.

Descriptors: *Environmental effects, *Political aspects, *Administration, *Governments, Federal government, Legal aspects, Economics, Legisla-

tion, Administrative agencies, Water purification, Ecology, Water pollution, Water pollution control, Water quality, Water Quality Act, Water quality standards, Pollution abatement.
Identifiers: *Refuse Act.

Political implications of government actions regarding pollution are assessed. The Internal Revenue Service's removal of tax exempt status of public interest law firms engaged in environmental litigation is intended to stop citizen suits brought against industry. This ruling is aimed mainly at environmentalists' use of the 1899 Refuse Act. Countering this, Senators Hart and McGovern have introduced a bill guaranteeing the citizen's right to protect the environment against unreasonable impairment. The inadequacy of present legislation in setting standards is reflected by the relative absence of prosecution. Other than the actions of the Internal Revenue Service, the Administration has acted in the field of environmental quality, including the consolidation of pollution control agencies. However, the programs have failed to reach their potential due to a lack of funding. (Ilkson-Florida)
W72-11523

STATES JOIN THE POLLUTION BATTLE,
E. Holsendolph.
Fortune, October 1970, p. 116.

Descriptors: *Legislation, *State governments, *Pollution abatement, *Regulation, Administrative permits, Governmental interrelations, Administration, Comprehensive planning, Legal aspects, Standards, Effluents, Oil pollution, Air pollution, Mine wastes, Nuclear reactors, Law enforcement, Michigan, California, Illinois, Maine, Arizona, Washington, Vermont.

Many cities and virtually all states have some pollution control laws. Some of the more recent state laws are described. Michigan enacted a law allowing citizens to sue polluters without showing evidence of direct personal injury. California stiffened enforcement of its vehicular-emission standards, already the toughest in the nation. In Illinois the new environmental protection agency, with a five-member board appointed by the governor, is combating air, water, and noise pollution. Vermont has enacted laws creating a permit system whereby all facilities that discharge effluents into waterways must obtain permits from a state agency. Maine has enacted a tough new environmental protection package to protect its coastal waters from oil spills. In Arizona a reapportioned legislature imposed stiff emission standards drafted by the state board of health. The Washington legislature has approved anti-pollution laws dealing with nuclear plant siting, oil spills and open-pit mines. However, the effectiveness of antipollution programs depends upon enforcement. To consolidate antipollution forces and improve enforcement several states preceded the federal government in setting up 'environment departments'. (Widman-Florida)
W72-11525

WILLAPA RIVER AND HARBOR NAVIGATION PROJECT, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 04A.
W72-11530

COPAN LAKE, LITTLE CANEY RIVER, OKLAHOMA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 08A.
W72-11544

INTERNATIONAL LAW AND THE PROTECTION OF THE OCEANS FROM POLLUTION,
Fordham Univ., New York.
L. A. Teclaff.
Fordham Law Review, Vol 40, p 529-564, 1972. 175 ref.

Descriptors: *Law of the sea, *International law, *Pollution abatement, *Legal aspects, *International waters, Treaties, Federal government, Coordination, Oil pollution, Waste disposal, Radioactive waste disposal, Jurisdiction, Judicial decisions, Law enforcement, Water pollution control, Water quality.

Because marine pollution has only recently been recognized for what it is--a problem of global dimensions and extreme complexity--international law has not yet evolved specific rules for dealing with it. International conventions have dealt with varying degrees of success with such areas as oil pollution, dumping of radioactive waste and other toxic materials, direct dumping of wastes from the land, and seabed exploitation. International law generally imposes on users a duty not to pollute the oceans. Both private and state entities are responsible when they are remiss in fulfilling this duty. Similar in type and scope is the responsibility of the state for pollution caused by private ships and enterprises under its jurisdiction on the high seas. However the procedural aspects in this area are not at all settled. The scope of jurisdiction of coastal states is discussed, breaking this into jurisdictions within twelve miles of the coast and beyond twelve miles. The prohibition of pollution must be sought in the general rules pertaining to the use of the sea and standards must be uniformly established for all ocean waters. While a real problem exists in proceeding effectively against polluters in particular instances, a single international tribunal with jurisdiction in this area might be one answer. (Widman-Florida)
W72-11552

THE NATIONAL INDUSTRIAL POLLUTION CONTROL COUNCIL: ADVISE OR COLLUDE,
Washington Univ., Seattle.
W. H. Rodgers, Jr.
Boston College Industrial and Commercial Law Review, Vol 13, p 719-747, 1972. 147 ref.

Descriptors: *Federal government, *Pollution abatement, *Administrative agencies, *Industries, *Governmental interrelations, Legislation, Administration, Adoption of practices, Coordination, Governments, Legal aspects, Political aspects, Project planning, Institutional constraints, Federal project policy.

The dominant industry advisory committee on environmental issues has been the National Industrial Pollution Control Council (NIPCC), established by Executive Order on April 9, 1970. Three aspects of NIPCC's performance are analyzed: (1) the promise and risks it has presented; (2) its procedural performance, as tested by governing law; and (3) its accomplishments as measured by expectations. NIPCC is portrayed as a dangerously anticompetitive institution occasionally doing business in violation of the law. The Council has published public relations material and some useful data, but it has served more importantly as a lobbying forum for discontented industries. Recommendations designed to make the advisory committee more responsive are made. These recommendations include public access to advisory committee proceedings and further reporting obligations for trade associations. The enduring lesson of the NIPCC should provide the touchstone for reform; when members of an industry attempt to influence their government, they should be required to do so publicly. (Widman-Florida)
W72-11553

THE TENNESSEE WATER QUALITY CONTROL ACT OF 1971: A SIGNIFICANT NEW ENVIRONMENTAL STATUTE,
Tulane Univ., New Orleans, La.
For primary bibliographic entry see Field 06E.
W72-11556

A SHOCK-WAVE TECHNIQUE TO COLLAPSE THE VACUOLES OF BLUE-GREEN ALGAE,
University of Wales Inst. of Science and Tech., Cardiff.
D. C. Menday, and A. A. Buck.
Water Research, Vol 6, No 3, p 279-284, 1972. 5 fig, 18 ref.

Descriptors: *Algal control, *Cyanophyta, Explosives, Costs, Fish, Fishkill, Reservoirs, Fisheries, Pressure.
Identifiers: *Shock-waves, *Gas-vacuole deflation, South Wales, Microcystis aeruginosa, Anabaena.

A field system designed to control blue-green algae by producing pressure waves to burst their gas-vacuoles, causing them to sink, is described. The pressures required to burst gas-vacuoles of Microcystis aeruginosa, the design of an explosive system, together with methods to record pressure distribution, and the adverse effects of such pressures on fish are considered. The primary concern is the possible application in an industrial water-supply reservoir in South Walwes where the principal algae is Microcystis aeruginosa and where brown trout (Salmo trutta) have been introduced for angling. It was found that a pressure of about 4.5 kg/sq cm was required to burst vacuoles in all cells of M. aeruginosa. The technique developed provided a quick and cheap control method when a blue-green algal bloom is seriously affecting a water supply. It is not suggested that explosives should be used as a regular means of algal control. It situations where algae accumulate near abstraction points, this technique has practical advantages with low operational costs and avoidance of capital charges, particularly applicable where blooms are infrequent or of short duration. (Jones-Wisconsin)
W72-11564

FISH THAT WEED THE WATER.
For primary bibliographic entry see Field 04A.
W72-11568

POSSIBLE IMPACT OF COSTS OF SELECTED POLLUTION CONTROL EQUIPMENT ON THE ELECTRIC UTILITY INDUSTRY AND CERTAIN POWER INTENSIVE CONSUMER INDUSTRIES.
National Economic Research Associates, Inc., New York.

Available from the National Technical Information Service as PB-207 167, $3.00 in paper copy, $0.95 in microfiche. Prepared for: Council on Environmental Quality, Wash., D.C., January 5, 1972. 105 p, 26 tab, append.

Descriptors: *Electric power industry, *Pollution abatement, *Electric power costs, Costs, Prices, Economic impact, Regulation, Electricity.
Identifiers: *Power intensive industries, Employment effects.

The impact of pollution control equipment on the electric power industry will depend on supply and demand characteristics, use and availability of fuels, the industry's employment characteristics, and future trends in electricity generation. Analysis of these factors and a set of assumptions about future pollution regulations suggest that the price of electricity may rise by about 7 per cent by 1976 due to the costs of installing and maintaining pollution control devices. No significant dislocation within either the electric utility industry or industry at large is expected. Data from the 1967 Census of Manufacturers indicates that there were only six industrial classifications for which electric power costs amounted to 5 per cent or more of the total value of shipments. These classifications include the Atomic Energy Commission plants, the primary aluminum industry, electrometallurgical products, the chloralkali industries, industrial gases, and hydraulic cement. Even in these six industries few dislocations are expected because of higher electricity prices. Moreover, any employ-

ment effect would be minor relative to total employment since these industries have a labor force which represents only 0.2 per cent of the total U.S. labor force. (Settle-Wisconsin)
W72-11589

PUZZLED ABOUT SURCHARGES. HERE'S HOW DURHAM OPERATES,
North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 05D.
W72-11593

PHOTOSYNTHESIS--POLICIES AND PROGRAMS FOR GREAT POTENTIALS, BEGINNING STAGES FOR EFFECTIVE WATER MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11594

AEROBIC LAKE MUDS FOR THE REMOVAL OF PHOSPHORUS FROM LAKE WATERS,
Wisconsin Univ., Madison. Water Chemistry Lab.
G. P. Fitzgerald.
Limnology and Oceanography, Vol 15, No 4, 1970, p 550-555. 5 tab, 14 ref.

Descriptors: *Phosphorus, *Lake beds, *Algae, Algal control, Nutrient requirements, Sorption, Eutrophication, Deficient elements, Essential nutrients, *Aerobic conditions, Water pollution control.
Identifiers: Lake mud, Phosphorus sorption, Phosphorus removal, Rate of sorption.

Bioassays of algae indicated that they became phosphorus or nitrogen-limited despite the fact that the algae were close to muds containing both phosphorus and nitrogen compounds. Laboratory tests were conducted to determine if the phosphorus of lake muds is readily available to algae under aerobic conditions. Phosphorus-limited Selenastrum and Cladophora will respond by growth or changes in extractable PO4-P to as little as 0.02 mg PO4-P in solution; these species did not respond when exposed for a period of 1 or 2 weeks to as much as 2 mg of phosphorus as lake muds under aerobic conditions. Studies of the rate of sorption of phosphorus by lake muds under aerobic conditions from two lakes, and from three depths in one lake, indicated that as little as 0.4 g (dry weight) of mud could sorb about 0.05 mg PO4-P in less than 30 min. These findings suggest that the sorption of phosphorus by lake muds under aerobic conditions can be used to remove phosphorus from lake water. (Morgan-Texas)
W72-11617

INFLUENCE OF TEMPERATURE AND TURBULENCE ON THE OXYGEN TRANSFER IN WATER,
K. R. Imhoff, and D. Albrecht.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 11, Hall A, Paper No 22, June 22, 1972. 11 p, 8 fig, 1 tab, 25 ref.

Descriptors: *Oxygenation, *Turbulence, *Temperature, Mathematical models, Reaeration, Saturation, Dissolved oxygen, Aeration, Mixing, Mass transfer, Evaporation, Bubbles, Activated sludge, *Waste water treatment, Water pollution control.

The results of oxygen transfer tests have been converted directly to reference temperatures according to well established procedures. However, a review of the literature on oxygen transfer and temperature and turbulence effects has demonstrated that the temperature influence on oxygen transfer in water depends on the individual system, and therefore there is no single overall relationship which applies. Since the engineer is required to design systems without having the opportunity to conduct tests, a classification of the existing systems was established to improve the prediction of temperature influence. For naturally aerated waters, the calculation method suggested by Churchill was adopted, while pneumatic aeration systems and mechanical aerators with low turbulence were clearly described by the equation of Pasveer. Mechanical aerators with energy supplies of 20 watts/m cu on-wards follow the principle of saturation values. Based on these calculations, it was determined that for the high energy activated sludge process, the observed dependency for mechanical aerators (impellers, turbines, cylinders, etc.) should be used as a general basis to insure sufficient aeration regardless of temperature. (Lowry-Texas)
W72-11618

SELF-PURIFYING ACTIVITY OF SEA WATER: PROPOSAL FOR LOW COST TREATMENT OF A WELL DEFINED AREA,
Naples Univ. (Italy). Istituto di Igiene.
A. Paoletti.
Preprint, presented at Sixth International Water Pollution Research Conference, Session 9, Hall C, Paper No 19, June 21, 1972. 5 p, 4 fig, 7 ref.

Descriptors: *Domestic wastes, *Oceans, *Self-purification, *Waste assimilative capacity, Waste dilution, Bacteria, Disinfection, Coagulation, Flocculation, Dispersion, Sedimentation, Activated sludge, Aesthetics, Waste water treatment, Water pollution control.
Identifiers: *Italy, *Naples (Italy).

The biological factors of sea water self-purification: (1) bactericidal; (2) antibiotic; (3) lytic factors; and (4) predatory phenomena, are all being utilized in the area of Cuma to provide treatment for 2-4 cubic meters/sec of domestic sewage from the western area of Naples. The wastes are restricted in a well defined area owing to the strong action of waves, winds and currents, and to the presence of rock walls built for the purpose of preventing dilution and dispersion of coarse material over a long distance. Recent field data indicate that bacteria are subject to the action of not only the biological factors mentioned, but also to flocculation and sedimentation. The biota in the presently utilized area are also similar in number and function to those present in activated sludge. Further improvements suggested include: (1) coarse material removal (rags, paper, plastics, etc.) for aesthetic purposes; (2) basin delimitation with 2 rock-full dams 100 to 150 meters long to arrest irregular sewage dispersion; and (3) further treatment improvements (sedimentation, chemical addition, supplemental basin aeration, etc.). (Lowry-Texas)
W72-11626

COMPARISON OF THIN-FILM EVAPORATION AND FREEZE DRYING METHODS OF CONCENTRATION OF ORGANICS IN WATER,
Rensselaer Polytechnic Inst., Troy, N.Y.
I. J. Kumar.
Master's Thesis, April 1971. 104 p, 19 fig, 10 tab, 39 ref.

Descriptors: *Organic compounds, *Analytical techniques, *Chromatography, Sewage, Natural streams, Evaporation, Freeze drying, Hydrolysis, Temperature, Biodegradation, Laboratory tests, Taste, Odor, Color, Water quality control, *Waste water treatment, *New York.
Identifiers: *Polymerization, *Lake George (NY), *Saratoga Lake (NY).

Trace organics in water samples from Lake George and Saratoga Lake, as well as raw sewage and sewage effluent from the Clifton Knolls Sewage Treatment Plant, were concentrated using both thin-film evaporation and Freeze-Drying methods. Organic carbon recovery by thin-film evaporation was superior to that of freeze-drying for all samples. Chromatograms obtained for both methods showed an identical number of peaks at about the same elution volume, and the cumulative percentage versus molecular weight curves were also similar, with a maximum difference of 2 to 3% ascribed to experimental error. These results demonstrate: (1) no significant polymerization or degradation was observed in either technique; (2) although recovery from freeze-drying is less than that of thin-film evaporation, no evidence of selective removal of a compound or compounds during freeze-drying is apparent. Results further indicate thin-film evaporation as superior for natural waters, and freeze-drying better for concentrating sewage samples because of the lessened chances of degradation at lower temperatures. (Lowry-Texas)
W72-11632

BUILDING BANS ABOUND AS POLLUTION PEOPLE CONTINUE TO CRACK DOWN.

Engineering News Record, Vol 185, April 1970. p 9-10.

Descriptors: Treatment facilities, *Sewers, *Pollution abatement, Construction, Costs, New York, New Jersey, Pennsylvania, Virginia, Maryland, Indiana, California, Georgia, Ohio, Water pollution control, *Cities.
Identifiers: *Construction bans, Court order, Cleveland, San Francisco.

Cities in New York, New Jersey, Pennsylvania, Virginia, Maryland, Indiana, California, Georgia and Ohio have recently been under new building construction bans. Essentially, the bans have been legal orders to stop new building construction until treatment plants or sewers are built or upgraded to handle the increased load the new construction would place on them. It was estimated that about $20 to $30 million worth of new construction in the Cleveland area would be delayed during 1970. In San Francisco over $80 million in new construction permits were issued in one week after a building ban had been lifted by a court order. The building ban has been an effective means of getting action in many situations. Several examples were illustrated. (Galwardi-Texas)
W72-11641

TRANSACTIONS OF THE 36TH NORTH AMERICAN WILDLIFE AND NATURAL RESOURCES CONFERENCE.
For primary bibliographic entry see Field 06G.
W72-11681

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

CONJUNCTIVE USE OF WATER IN WEST TEXAS-BENEFITS TO NONCOOPERATORS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 04B.
W72-11116

THE RIVER BASIN MODEL: DIRECTOR'S GUIDE.
Envirometrics, Inc., Washington, D.C.

Copy available from GPO Sup Doc EPA.10:16110, FRU 12/71-2 $1.75; microfiche from NTIS as PB-210 855, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, December, 1971. 229 p, 19 fig, 11 append. EPA Program 16110 FRU 12/71-2.

Descriptors: *Regional analysis, *Simulation analysis, *Computer programs, *Training, *Decision making, *Population, *Water demand, *Water users, *Water pollution control, *Treatment.
Identifiers: *Gaming-simulation, Holistic models.

The RIVER BASIN MODEL is a man-machine simulation model used to delineate the interactions taking place, within a real or hypothetical area, between the local water system and the economic, social, and governmental activities of that area; it is a model of an entire regional system, with water a subsystem realistically interacting with all the other major subsystems, such as transportation. The Director is responsible for the operation of the Model in a gaming mode; he acts as a communication link among all participants and frequently between participants (players) and the computer. He may make inputs and distribute output in various ways. Presented is a manual describing what the Director needs to know in order to operate the Model, influence play, answer questions and use the Model to meet established objectives. The guide focuses on three major areas: (1) Pregame--responsibilities before the start of a program, such as choice of structure and formation of teams; (2) Optional formats--provision for complementary activities, such as town meetings and mass media presentations; and (3) Model operations--details for operating the Model itself. (Bell-Cornell)
W72-11171

JORDAN AQUEDUCT, BONNEVILLE UNIT, CENTRAL UTAH PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11181

BENEFIT-ACCURACY RELATIONSHIP FOR SMALL STRUCTURE DESIGN FLOODS,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
K. C. Wilson.
Water Resources Research, Vol. 8, No. 2, p 508-512, April, 1972. 1 fig, 2 ref.

Descriptors: *Flooding, *Flood control, *Hydrometry, *Planning, Cost-benefit analysis, Mathematical models, Optimization, Water resources development, Construction costs.
Identifiers: *Hydrometric networks.

A model for applying cost-benefit economic analysis to hydrometric planning is developed. The optimal expenditure on a flood control project is seen to lie between the two extremes of (1) minimizing the actual installation costs, and (2) maximizing the flood protection. Within the framework of this model, optimality is achieved by minimizing the sum of construction costs and the present value of the probable future damage from flooding. At the optimum, the cost of an incremental increase in the design flow should just equal the value of the benefits arising from this incremental increase. By expressing cost and discharge as ratios of the values at the optimum point, a dimensionless equation is derived which links the error in flood flow estimates to the resulting increase in the cost of flood control. This expression includes only two parameters, and when the error in flood estimation is not excessively large this cost-accuracy relationship reduces to a simple square law. These parameters are estimated for a representative case, and the application of the method to network planning is indicated. (Settle-Wisconsin)
W72-11215

SYSTEMS ANALYSIS OF THE PANAMA CANAL WATER SUPPLY,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
For primary bibliographic entry see Field 04A.
W72-11223

SYSTEM RELATIONSHIPS FOR A PANAMA CANAL WATER SUPPLY STUDY,
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 04A.
W72-11224

MODELING PROBLEMS AND PROBLEM AVOIDANCE IN WATER RESOURCE MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Graduate School of Business and Public Administration.
J. E. Hass.
Water Resources Research, Vol. 8, No. 3, p 785-789, June, 1972. 13 ref.

Descriptors: Water resources, *Management, *Mathematical models, *Systems analysis, Government finance, Economics, *Model studies.
Identifiers: Receiving waters, Trade, *Discharge rights.

Three basic categories of modeling are discussed. The first is labeled basic component modeling which, for example, may be utilized for building DO models; the most simple of the three, the problem at the basic component level is a lack of knowledge, primarily of the more elusive water quality characteristics. The second type of modeling is systems analysis modeling. It provides a framework in which the various basic components are integrated; it is the link between the decision variables and the physical--biological variables of a system. The third class of modeling is systems design modeling, in which the modeler must designate the optimal treatment scheme for a given watershed, for example. Classes of problems facing the modeler are discussed. Ways of avoiding problems by creating artificial marketplaces to allocate the assimilative capacities of receiving water more efficiently are presented. Finally, examination is made of the extent to which other problems could be avoided if the government were to create and sell discharge rights that would then be freely traded in a 'rights market.' (Bell-Cornell)
W72-11225

DECOMPOSITION AND MULTILEVEL TECHNIQUES FOR WATER QUALITY CONTROL,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 05G.
W72-11226

IMPACT OF SYSTEMS TECHNIQUES ON THE PLANNING PROCESS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
D. C. Major.
Water Resources Research, Vol. 8, No. 3, p 766-768, June, 1972. 4 ref.

Descriptors: Water resources, *Planning, *Systems analysis, Mathematical models, Water supply, Water demand, *Evaluation, Coordination.
Identifiers: *Multiple objectives.

Systems analysis has been used successfully in the North Atlantic regional (NAR) water resources study. Described are the major impacts of systems techniques on the planning process in the NAR study. The techniques discussed are an input-output-based demand projection model and a mathematical programming supply model. The impacts discussed relate to the coordination and control of the planning process, the assessment of uncertainty, the consideration of multiple objectives, the efficiency of planning, the scope for the exercise of judgment, and the opportunity for a planning process continued beyond the final report. The impact of systems techniques has been positive; no major water resource planning should be undertaken without a commitment to the use of systems techniques. (Bell-Cornell)
W72-11227

THE RIVER BASIN MODEL: MUNICIPAL SERVICES DEPARTMENT.
Envirometrics, Inc., Washington, D.C.

Copy available from GPO EP2.10:16110FRU 12/71-8 Sup Doc, $1.00; Environmental Protection Agency, Water Pollution Control Research Series, December, 1971. 93 p, 26 fig, 4 tab, 2 append. EPA Program 16110 FRU 12/71-8.

Descriptors: *Regional analysis, *Decision making, *Simulation analysis, *Computer programs, *Mathematical models, *Public health, *Municipal water, *Water users, *Water demand, *Water pollution control, *Treatment.
Identifiers: *Governmental processes, *Public policy, *Public services, *Gaming-simulation.

The RIVER BASIN MODEL is not primarily a water management model. Through human interaction and computer simulation, it and its users represent the major economic, social, and governmental decision-making which causes a regional system to function nd change on a year-to-year basis. As part of the functioning of this system, water is demanded by industries and municipal water suppliers and pollution is generated by manufacturing and commercial activities, by people, and by farm activities. A gaming format is employed; model users provide inputs to the computer programs on behalf of business activities in the Economic Sector, groups of people or population units in the Social Sector, and government departments in the Governmental Sector. The Governmental Sector and the model required by its Municipal Services Department are described. A principal function of the Governmental Sector is to provide public services, and its participants are elected and appointed public officials. The Municipal Services Department provides services (police, fire, health) to population units and economic activities; it makes decisions affecting quality of life in the neighborhoods it serves as well as affecting business costs. (Bell-Cornell)
W72-11271

THE RIVER BASIN MODEL: SCHOOL DEPARTMENT.
Envirometrics, Inc., Washington, D.C.

Copy available from GPO Sup Doc EP2.10:16110 FRU 12/71-7, $1.00; Microfiche from NTIS as PB-210 859, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, December, 1971. 94 p, 25 fig, 3 tab, 2 append. EPA Program 16110 FRU 12/71-7.

Descriptors: *Regional analysis, *Education, *Simulation analysis, *Computer programs, *Decision making, *Mathematical models, *Water demand, *Water users, *Water pollution control, *Treatment.
Identifiers: *Public policy, *Governmental processes, *Gaming-simulation.

The RIVER BASIN MODEL and its users represent an entire regional system's economic, social, and governmental activities; water decisions are placed within their realistic context of having different importance to different individuals as a function of their occupation, location, resources, and personal inclinations. The model is a human interaction, computer-simulation decision-making tool. Its users provide inputs to the computer programs on behalf of business activities in an Economic Sector, groups of people or population units in the Social Sector, and government departments in the Governmental Sector. A gaming format is employed. Presented is a description of the functions of the Government Sector and the model required by its School Department. The Government Sector represents the management apparatus for the public sector of the area represented by the Model. Its participants are the elected and appointed public officials. This Sector can make public policy, implement plans and programs, provide public services and raise and disperse funds. The School Department provides child and adult education for citizens in the local jurisdictions. The demand for school services within a district is dependent upon the number and class of population units located within the boundaries of the school district. (Bell-Cornell)
W72-11272

Envirometrics, Inc., Washington, D.C.

Copy available from GPO Sup Doc EP2.10:16110 FRU 12/71-4, $1.25; microfiche from NTIS as PB-210 860, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, December 1971. 117 p, 27 fig, 2 tab, 1 append. EPA Program 16110 FRU 12/71-4.

Descriptors: *Social needs, *Social values, *Population, *Water users, *Water demand, *Water pollution control, *Treatment, *Regional analysis, *Simulation analysis, *Decision making, *Computer programs, *Mathematical models.
Identifiers: *Social assets, *Gaming-simulation.

The RIVER BASIN MODEL is not primarily a water management model. Through human interaction and computer simulation, it represents the entire complex economic, social, and governmental activities taking place within a specified local system. Its users represent the major economic, social, and governmental decision-makers who cause a regional system to function and change on a year-to-year basis. As part of the functioning of this regional system, water is demanded by industries and municipal water suppliers and pollution is generated by manufacturing and commercial activities, by people, and by farm activities. The model is a computer-assisted decision-making tool in which computer programs simulate the major processes. Its users provide inputs to these programs on behalf of business activities in the Economic Sector, groups of people or population units in the Social Sector, and government departments in the Governmental Sector. A gaming format is employed. Decision-makers in the Social Sector represent the citizens living and working in the simulated area, voters who concern themselves with employment, housing, schools, parks, the quality of life and the character of the region in which they live. Water decisions are placed within their realistic context of having different importance to different individuals as a function of their occupation, location, resources, and personal inclinations. (Bell-Cornell)
W72-11273

THE RIVER BASIN MODEL: ECONOMIC SECTOR.
Envirometrics, Inc., Washington, D.C.

Copy available from GPO Sup Doc EP2.10:16110 FRU 12/71-3, $1.25; microfiche from NTIS as PB-210 861, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, December, 1971. 151 p, 43 fig, 6 tab, 1 append. EPA Program 16110 FRU 12/71-3.

Descriptors: *Regional analysis, *Economics, *Water demand, *Water users, *Water pollution control, *Treatment, *Simulation analysis, *Computer programs, *Decision making, *Mathematical models, *Industries, *Farms.
Identifiers: *Economic assets, *Gaming-simulation.

The RIVER BASIN MODEL is not primarily a water management model. It is a human interaction, computer-simulation decision-making tool, representing the entire complex economic, social, and governmnetal activities occurring within a specified local system. Its users represent the major economic, social, and governmental decision-makers who cause the regional system to function on a year-to-year basis. As part of the functioning of this system, water is demanded by industries and municipal water suppliers and pollution is generated by manufacturing and commercial activities, by people, and by farm activities. The model provides computer programs which simulate the major processes. Model users provide imputs to these programs on behalf of business activities in the Economic Sector, groups of people or population units in the Social Sector, and government departments in the Governmental Sector. A gaming format is employed; Economic Sector teams control regional economic assets: cash, land, manufacturing plants, outside investments, commercial activities, and/or residences. Economic decision-makers are those businessmen who operate commercial, industrial, residential and farm establishments. Water decisions are made within their realistic context of interaction with the regional processes. Industrial activities use surface water and all other economic businesses have some need for municipally supplied water. (Bell-Cornell)
W72-11274

MATHEMATICAL MODELLING IN HYDROLOGY,
Geological Survey, Fort Collins, Colo. Water Resources Div.
For primary bibliographic entry see Field 02A.
W72-11292

CALCULATION OF EXPECTED VALUES OF OBSERVABLES IN SOME PROBLEMS OF STATISTICAL GEOMORPHOLOGY,
Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
For primary bibliographic entry see Field 02A.
W72-11294

MATHEMATICAL MODELS AND THEIR USE IN WATER RESOURCES DECISION-MAKING,
Department of Fisheries and Forestry, Ottawa (Ontario).
A. K. Biswas.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol. 5, Paris, France, p. 241-248, Aug-Sept 1971. 23 ref.

Descriptors: *Mathematical models, *Optimum development plans, *Water resources development, Project planning, River basin development, Model studies, Models, Decision making, Water resources, Social aspects, Water utilization, Computer applications, Bibliographies, Simulation, Mathematical analysis, Computer models, Planning.

Use of mathematical models in the field of water resources planning is not new, but our current capability to analyze more complex systems is new. Basically, models can be divided into 2 categories: programing and descriptive. Programing models derive the optimal policy for a given objective function; descriptive models predict the values of endogenous variables for a given set of exogenous variables. Models can significantly aid the decisionmaker in arriving at better decisions by broadening his information base, by predicting the consequences of several alternative courses of action, or by selecting a suitable course of action to accomplish a prescribed result. Models augment rather than replace experience. The fundamental aspect of any decisionmaking process is the participation of those who may be affected by the decision itself. The model builder can play an important part in the decisionmaking process by informing the public of the feasible alternatives and the possible consequences of each. The public, using this knowledge, can then make more meaningful decisions. The policy implications of the mathematical programing model and the simulation model developed for the Saint John River System of Canada are discussed. (USBR)
W72-11362

SYSTEMS APPROACH TO REGIONAL WATER USE AND DEMAND,
Department of Fisheries and Forestry, Ottawa (Ontario).
For primary bibliographic entry see Field 06D.
W72-11363

A QUANTITATIVE FRAMEWORK FOR RESIDUALS MANAGEMENT DECISIONS,
Resources for the Future, Inc. Washington, D.C.
For primary bibliographic entry see Field 05G.
W72-11501

WATER QUALITY PREDICTION WITHIN AN INTERBASIN TRANSFER SYSTEM,
Texas Water Devleopment Board, Austin. Systems Engineering Div.
For primary bibliographic entry see Field 05B.
W72-11652

6B. Evaluation Process

THE RIVER BASIN MODEL: DIRECTOR'S GUIDE.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11171

THE ENERGY-ENVIRONMENT CONFLICT: SITING ELECTRIC POWER FACILITIES,
Virginia Univ., Charlottesville. School of Law.
For primary bibliographic entry see Field 06G.
W72-11172

OCONTO HARBOR, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 08A.
W72-11179

JORDAN AQUEDUCT, BONNEVILLE UNIT, CENTRAL UTAH PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11181

EFFECT OF WATER AVAILABILITY ON MANUFACTURING EMPLOYMENT IN THE TENNESSEE VALLEY REGION,
Tennessee Univ., Knoxville. Coll. of Business Administration.
C. B. Garrison, and A. S. Paulson.
Water Resources Research, Vol. 8, No. 2, p 301-316, April, 1972. 10 tab, 11 ref, append.

Descriptors: *Water supply, *Employment, *Water users, *Industries, Regression analysis, Tennessee.
Identifiers: *Manufacturing, *Tennessee Valley.

A significant relationship was found between water-oriented manufacturing employment and water availability, where water avilability is measured in terms of 7-day, 10-year minimum streamflow, in the 194-county Tennessee Valley region. Using employment change and competitive effect in number of employees as dependent variables, chi square tests of independence indicate that concentrations of at least 500 employees in water-oriented manufacturing are significantly related to water availability. Total manufacturing employment in the region in 1968 was 682,788. Of this number. 106,274 was accounted for by concentrations in water intensive employment of at least 500 in countries with a flow of at least 400 cfs. To explain the variation in employment per river mile among small regions, a regression equation with population density as the independent variable was constructed. The model was specified to be log-linear. The regression indicates that, for a difference of 10% in population density between small regions, employment per river mile varies by 8.15%. These findings suggest that public investment projects which augment minimum streamflow to values greater than 400 cfs may favorably alter a small region's location characteristics for water intensive manufacturing industries. (Settle-Wisconsin)
W72-11208

AN ANALYSIS OF LATENT DEMAND FOR WATER-BASED OUTDOOR RECREATION FACILITIES,
Oklahoma State Univ., Stillwater. Dept. of Geography.
For primary bibliographic entry see Field 06D.
W72-11209

RECREATIONAL OPPORTUNITIES AND COMMUNITY PATTERNS OF NONPARTICIPATION IN WATER-BASED RECREATION IN OKLAHOMA,
Oklahoma State Univ., Stillwater. Dept. of Geography.
R. D. Hecock.
Rocky Mountain Social Science Journal, Vol. 9, No. 2, p 11-17, April, 1972. 2 fig, 3 tab.

Descriptors: *Recreation, *Recreation facilities, *Recreation demand, *Social aspects, Water utilization, Statistical methods, Oklahoma, *Water demand.
Identifiers: *Recreation supply, Nonparticipation.

The following hypothesis is posed: water recreation facilities or opportunities are relevant variables in explaining patterns of nonparticipation in water recreation activities. To test this hypothesis, data obtained from a 1969 survey of approximately 4,100 Oklahoma households were analyzed. Nearly one-half of the Oklahomans surveyed did not participate in water-based recreation activities. Generally, the geographical patterns of nonparticipation appear to correspond with an east to west decline in water-recreational resource opportunities in Oklahoma. This relation was particularly apparent for swimming and boating. Nonparticipation in these activities rapidly increases if opportunities are more than a few miles away. For fishing and water skiing, however, there was no significant statistical relationship between water resource opportunities and the nonparticipation rates, suggesting that the availability of nearby opportunities is not very important for these activities. Overall, the study suggests that opportunity availability is a factor in explaining nonparticipation in some instances of water-based recreation activities. While these are not the only relevant variables, they are at least equal to socioeconomic factors in explaining boating and swimming activities. In the case of water skiing and fishing, it seems likely that different measures of opportunity are required. (Settle-Wisconsin)
W72-11210

RURAL WATER SUPPLIES IN DEVELOPING COUNTRIES,
World Health Organization, Washington, D.C. Pan American Sanitary Bureau.
D. Donaldson.
Water Resources Bulletin, Vol. 8, No. 2, p 391-398, April, 1972. 10 ref.

Descriptors: *Water supply development, *Rural areas, *Water resources development, Planning, Financing, Water demand.
Identifiers: *Less developed countries, *Latin America.

The best available figures indicate that on a global basis only about 10 per cent of the rural populations have a safe source of water, with the Americas having the highest coverage at 19 per cent. The scope of the problem of further developing rural water supplies is enormous. A recent U.N. proposal called for the installation of 20,000 rural water systems each year for the next ten years. For an estimated cost of 1.6 billion dollars, this project would provide coverage to an additional 200 million rural inhabitants. Yet, such an effort would still leave 80 per cent of the world's rural inhabitants without safe water supplies. The development of a rural water supply can be viewed as having the following three parts: (1) community wells for the dispersed population; (2) a rudimentary aqueduct for the semiconcentrated population; and (3) a rural aqueduct for the concentrated population. Successful rural water development programs exemplify certain common elements. They are part of a national or master plan; the staff have been trained in rural techniques; community participation is strong; simple economical designs are employed; and water rates cover operation and maintenance costs. The use of revolving funds may help finance the projects. (Settle-Wisconsin)
W72-11211

AN ECONOMIC ANALYSIS OF WATER RESOURCE USE AND USE CONFLICTS OF SELECTED INDUSTRY GROUPS IN ALABAMA WITH RESPECT TO AREA DEVELOPMENT,
Auburn Univ., Ala. Dept. of Economics.
R. L. Burks.
M Sc Thesis, December 12, 1968. 111 p, 7 fig, 24 tab, 72 ref, 9 append.

Descriptors: *Water utilization, *Water users, *Industrial water, *Competing uses, Industrial plants, Water resources development, Economic efficiency, *Alabama.
Identifiers: *Manufacturing.

The utilization of Alabama's water resources are analyzed in order to determine the water supply-demand situation for industrial firms and to isolate significant industrial water problems. The primary source of data for the study was a questionnaire survey of over 235 industrial firms. The study suggested that principal water-using industries exert a significant impact on Alabama's economy. Water-using industries employed over 50 per cent of Alabama's manufacturing workers and paid almost 56 per cent of the total annual payroll for all manufacturing. They also accounted for 74 per cent of the new capital expenditure by Alabama industry in recent years. The study also uncovered some significant water-conflict situations. Fifty firms were either currently experiencing water conflicts of some type or expected to encounter them in the near future. The most frequently reported conflict concerned quantitative uses of water interfering with a plant's waste-disposal practices. Some plants also experienced qualitative conflicts. Several firms expected a conflict to develop between future uses of water for recreational purposes and industrial use for transportation of waste materials. These conflicts need to be minimized if economic efficiency is to be assured. (Settle-Wisconsin)
W72-11218

CLEAN WATER: AFFLUENCE, INFLUENCE, EFFLUENTS, A DESIGN FOR WATER QUALITY MANAGEMENT.
For primary bibliographic entry see Field 05B.
W72-11219

AN ECONOMIC AND BIOSTATISTICAL ANALYSIS OF THE BAIT FISH INDUSTRY IN THE LOWER COLORADO RIVER,
Nevada Univ., Las Vegas.
F. A. Espinosa, J. E. Deacon, and A. Simmons.
Available from the National Technical Information Service as COM-72-10082, $3.00 in paper copy, $0.95 in microfiche. September, 1970. 87 p, 10 fig, 18 tab, 19 ref.

Descriptors: *Baits, *Bait fishing, *Fishing, Minnows, Salamanders, Supply, Demand, Fisheries, Colorado River, Recreational facilities.
Identifiers: *Recreational fishing.

The supply of and demand for bait fishes in the Lower Colorado River Complex is studied. The total number of retail bait outlets in this basin is 53. Seventeen of these outlets are in the Las Vegas-Lake Mead area; fourteen are in the Lake Havasu-Mohave County area; and ten are in the Parker Dam area. In 1968, bait sales in the study area were approximately $457,000, or roughly 4.3 million units of live salamander larvae and minnows. The supply of minnows produced in the basin meets only about 50 per cent of the retail demand. The remaining demand is met with minnows imported from two Central California hatcheries. A survey of 29,501 fishermen in the Lake Mead area indicated that about 62 per cent fished exclusively with live bait such as salamander larvae, golden shiners, and goldfish. Projections for increases in population, leisure time, mobility, income and tourism suggest that the demand for bait in the Lake Mead area is likely to increase at an annual rate of about 9 per cent in the next decade. Increases in minnow supply should meet these demand increases; however, the supply of salamanders should become quite erratic in the future. (Settle-Wisconsin)
W72-11220

FOREIGN DEEP WATER PORT DEVELOPMENTS, A SELECTIVE OVERVIEW OF ECONOMICS, ENGINEERING, AND ENVIRONMENTAL FACTORS,
Little (Arthur D.), Inc., Cambridge, Mass.
J. L. Goodier, M. C. Huston, B. M. Putnam, and B. L. De Frondeville.
Three vols available from NTIS, Springfield, Va. as AD-736 340, AD-736 341, and AD-736 342, for $9.00 paper copy or $2.85 microfiche. Army Engineer Institute for Water Resources Report IWR 71-11, Volumes I-III, December, 1971. 655 p, 6 fig, 27 tab, 8 append. DACW 31-71-c-0044.

Descriptors: *Harbors, *Deep water, *Economic feasibility, Engineering, Planning, Evaluation, Water resources development, Environmental effects, Cost sharing.
Identifiers: *Ports, *Port development, Foreign ports.

The economic advantages of large-scale ocean carriers of oil and ores have generated considerable pressure for the development of several deep ports in the United States providing drafts in excess of 60 feet. Several foreign deep-water port developments were studied. The port experiences analyzed were those of Dunkirk, Le Havre, Antwerp, Rotterdam, Amsterdam, Canada's Port Carter, Ireland's Bantry Bay, the Persian Gulf, the United Kingdom, Australia and Japan. The major categories of analysis were economics, engineering considerations, and environmental issues. The study suggests that a major bulk port needs (1) a deep access for 250,000 dwt ships, (2) efficient ship- and cargo-handling capability, (3) good transportation links with the interior, and (4) industrial land acreage ranging from 20,000 to 50,000 acres. Furthermore, major port development plans should be based on (1) good, long-range forecasts, (2) clear national strategies, (3) consideration of all possible location alternatives, (4) a flexible regional master plan, (5) plans for an integrated transportation system, (6) plans for the reorientation of existing ports, and (7) an implementation of mechanisms ensuring participation of and communication between all parties concerned. (Settle-Wisconsin)
W72-11222

SYSTEMS ANALYSIS OF THE PANAMA CANAL WATER SUPPLY,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
For primary bibliographic entry see Field 04A.
W72-11223

SYSTEM RELATIONSHIPS FOR A PANAMA CANAL WATER SUPPLY STUDY,
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 04A.
W72-11224

IMPACT OF SYSTEMS TECHNIQUES ON THE PLANNING PROCESS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W72-11227

THE RIVER BASIN MODEL: MUNICIPAL SERVICES DEPARTMENT.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11271

THE RIVER BASIN MODEL: SCHOOL DEPARTMENT.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11272
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11273

THE RIVER BASIN MODEL: ECONOMIC SECTOR.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11274

HISTORY OF FEDERAL WATER RESOURCES PROGRAMS, 1800-1960.
Economic Research Service, Washington, D.C.
B. H. Holmes.
Dept. of Agriculture Miscellaneous Publication No. 1233, June 1972, 51p.

Descriptors: *Water resources development, *Legislation, *Planning, *Institutional constraints, *Political aspects, Regional development, River basin development, History.
Identifiers: *Study commissions, *Congressional control.

This history of federal water resources planning and development programs begins with a summary description of the first legislation and planning reports for navigation, flood control, irrigation, and power projects which were initiated during the 19th Century; and notes the activities of the Army Corps of Engineers as the first federal construction agency. The next four chapters cover the 'Progressive era, 1901-1920', beginning with the planning commissions of Theodore Roosevelt, the 'Era of normalcy', 1921-1933' which includes the basic Rivers and Harbors Act of 1930, the 'New Deal in planning, 1933-1943' with the establishment of the National Resources Planning Board, and the 'Era of congressional control, 1943-1960' which includes a review of the influence of the study commissions, inter-agency coordinating committees, the two Hoover reorganization commissions, and the development of new planning procedures. Also discussed are national political issues related to water resources, such as the relationships between Congress and the Executive, between federal planning agencies, and the origins and continuation of federal policies which favored natural resources development to strengthen the economic condition of smaller cities, agriculture, and the West. (Cowgill-OWRR)
W72-11276

HYDROELECTRIC POWER DEVELOPMENT IN CENTRAL SIBERIA,
Waterloo Univ. (Ontario).
J. R. Bater.
Water Power, Vol. 24, No. 1, p 5-12, Jan 1972. 3 fig, 3 photo, 1 tab, 28 ref.

Descriptors: Water resources, *Management, *Water resources development, Project planning, Bibliographies, Hydroelectric power, Electric power production, Decision making, River basin development, Foreign projects, Economic justification, Cost analysis, Multiple purpose projects, Benefit-cost analysis, Priorities.
Identifiers: *Hydroelectric resources, USSR, Siberia, Angara River (USSR), Krasnoiarsk Powerplant (USSR), Bratsk Powerplant (USSR).

The purpose is to: (1) examine the hydroelectric development in a region well endowed with water resources (but escaping few of the current water management problems); and, (2) discuss aspects of the controversy over water management relevant to hydropower development. Central Siberia, with 2 important river systems of developed hydro potential--the Angara and the upper Yenisei--is discussed. Criticisms of low cost electricity, the principal economic benefit of hydropower in Central Siberia, are examined. Development priorities, cost considerations, cost-benefit assessment, and the environmental impact are reviewed. In Soviet river basin development programs, decisions frequently maximized benefits to the hydropower sector at considerable cost to other water users. Based on original terms of reference, these programs were deemed economical by Soviet decision makers; now, the terms of reference and evaluation procedures are being questioned. (USBR)
W72-11377

WATER RESOURCE PROJECTS AND ENVIRONMENTAL IMPACTS: TOWARDS A CONCEPTUAL MODEL,
Wisconsin Univ., Madison. Water Resources Center.
D. W. Bromley, N. L. Meyer, J. Stoltzenberg, and M. Warner.
Available from the National Technical Information Service as PB-210 918, $3.00 in paper copy, $0.95 in microfiche. Wisconsin Water Resources Center Madison, Completion Report, February 1972. 56 p, 7 fig, 2 tab, 15 ref, 2 append. OWRR B-057-WIS (1).

Descriptors: Land resources, Economics, *Environmental effects, *Model studies, *Evaluation, *Land use, *Idaho, Simulation analysis.

As multiobjective evaluation of water resource investments becomes more common, it is important to develop conceptual bases for including monetary as well as nonmonetary impacts in the evaluation process. This is currently hampered by the lack of a comprehensive and systematic model which permits the identification and display of the many project impacts. And, more importantly, there is little information on the linkage between economic activity and many environmental impacts. A start is made by depicting natural resource use by sector of economic activity, with concentration on land use. A simulation model is developed which will determine acres in certain land-use categories in Southern Idaho over time without any water development. By being able to predict land use changes with and without a project, the first step in linking economic activity to certain environmental impacts has been taken.
W72-11385

WATERSHED PLANNING.
Minnesota Univ., Minneapolis. Water Resources Research Center.

Available from the National Technical Information Service as PB-210 914, $3.00 in paper copy, $0.95 in microfiche. Papers presented at Seminar on Watershed Planning sponsored By the Metropolitan Council and the Minnesota Association of Watershed Districts, February 15, 1972, Bloomington, Minnesota. Minnesota Water Resources Research Center, Bulletin 50, April 1972. 63 p. OWRR A-999-MINN (24).

Descriptors: *Planning, *Watersheds (Basins), *Minnesota, Water resources, Land use, Legislation, *Inter-agency cooperation.
Identifiers: *Metropolitan Council, Advocacy positions, Joint Power Agreements, Development guide.

The objective of the Seminar on Watershed Planning was to gather area leaders representing watershed districts, municipal, county and State government, and private groups in an effort to stimulate further coordinated water resources planning in Minnesota. The following topics were discussed: Metropolitan Council, watershed district, and municipal water resources planning relationships; importance of open space to watershed district planning; watershed planning in Minnesota; Department of Natural Resources relationship to watershed districts; soil and water conservation relationships to watershed districts; and regional planning and watershed resources. In particular, the Seminar was concerned with the Metropolitan Development Guide and the overall plans of watershed districts. (Walton-Minnesota)
W72-11439

7 PRINCIPLES FOR AN URBAN LAND POLICY,
For primary bibliographic entry see Field 03D.
W72-11475

LEGAL AND POLITICAL CONDITIONS OF WATER RESOURCE DEVELOPMENT,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 06E.
W72-11484

CREATIVE WATERFRONT DEVELOPMENT,
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario). Waterfront Task Force.
For primary bibliographic entry see Field 03D.
W72-11485

REMOTE LAND - DEVELOPMENT OR EXPLOITATION,
W. H. Martin.
Urban Land, Vol 30, No 2, p 3-10, February 1971. 4 photo, 1 fig.

Descriptors: *Land development, *Exploitation, *Recreation demand, Planning, Zoning, Ecology, Environment, Regulation, Ethics, *California.
Identifiers: *Remote land, Western Developers Council.

As the pressures of increasing population and time for recreational pursuits continue, the desirability of remote lands for leisure activities and retirement will also increase. Some basic aspects of the development of remote land are discussed, including: purchase motivation, land acquisition, land development, and sales organization. Two examples of remote land development are discussed: Antelope Valley located in the San Gabriel Mountains, and Canyon Lake located in Riverside County about 70 miles southeast of Los Angeles. Although the concept of using zoning as a planning tool has worked well in most communities providing for compatible land uses, urban zoning classifications of industrial and multiple residential uses for remote land parcels appear to be inconsistent with good planning practices. An organization committed to setting and maintaining professional standards in the land development industry has been formed, the Western Developers Council. The Council's Code of Ethics is designed to serve as a guideline for members and the industry at large. It requires the use of professional master planners for recreation-residential developments in cooperation with ecological and environmental consultants; full and accurate disclosure of all conditions; and factual data in promotion and advertising efforts. It prohibits statements to potential buyers regarding a specific rate of future value appreciation over a particular time period. Development and observance of such a code is beneficial to the developer, purchaser, and land development industry. (Strachan-Chicago)
W72-11487

KALAMAZOO RIVER FLOOD CONTROL PROPOSAL: A CASE STUDY,
Western Michigan Univ., Kalamazoo.
For primary bibliographic entry see Field 04A.
W72-11490

CHICAGO'S LAKEFRONT PARKLAND: A GREAT LEGACY UP FOR GRABS,
L. Wille.

Inland Architect, Vol. 16, No. 2, p 8-15, February 1972. 8 photo, 1 fig.

Descriptors: *Conservation, *Lake Michigan, *Land use, Airports, Land development, Costs, Planning, *Illinois.
Identifiers: *Chicago.

The proposed overhaul of Chicago's Soldier Field is critized. Although this proposal appears at first to be a victory for the conservationists, the City would do better to destroy the stadium and use the land to expand Chicago's shoreline. There are three major threats to the future of Chicago's lakefront: (1) a proposed airport in the lake, (2) development of the Illinois Central air rights, and (3) the automobile. The proposed airport would be an extremely expensive undertaking, while compounding already existing problems of water, air, and noise pollution. Development of the Illinois Central air rights would further cut the city off from its lakefront by the construction of a wall of high rise buildings. City planners must reach some sort of rapprochement with motor traffic, and prohibit further erosion of the lakefront parks by road-widening, highway interchanges, and parking lots. The lakefront should not be appropriated by a few individuals to the exclusion of others. Background information is presented about environmental problems and their solutions in Chicago. (Strachan-Chicago)
W72-11491

THE FUTURE OF WASTEWATER TREATMENT - AN OPINION SURVEY.
For primary bibliographic entry see Field 05D.
W72-11493

WATER PROJECTS AND RECREATION BENEFITS,
Oregon State Univ., Corvallis. Dept. of Geography.
For primary bibliographic entry see Field 06E.
W72-11495

WILD AND SCENIC RIVERS: PRIVATE RIGHTS AND PUBLIC GOODS,
Washington Univ., Seattle. Dept. of Geography.
For primary bibliographic entry see Field 06E.
W72-11497

LEGISLATIVE NEEDS IN WATER--RESOURCES MANAGEMENT IN ALABAMA,
For primary bibliographic entry see Field 06E.
W72-11536

POSSIBLE IMPACT OF COSTS OF SELECTED POLLUTION CONTROL EQUIPMENT ON THE ELECTRIC UTILITY INDUSTRY AND CERTAIN POWER INTENSIVE CONSUMER INDUSTRIES.
National Economic Research Associates, Inc., New York.
For primary bibliographic entry see Field 05G.
W72-11589

COOPERATIVE COMMUNITY-UNIVERSITY WATER RESOURCE PLANNING: AN INTERDISCIPLINARY APPROACH,
Wisconsin Univ., Green Bay.
For primary bibliographic entry see Field 04A.
W72-11590

WATER DEMAND FORECASTS AND PLANNING MARGINS IN SOUTH-EAST ENGLAND,
London School of Economics and Political Science (England); and Queen Mary Coll., London (England).
For primary bibliographic entry see Field 06D.
W72-11592

PHOTOSYNTHESIS--POLICIES AND PROGRAMS FOR GREAT POTENTIALS, BEGINNING STAGES FOR EFFECTIVE WATER MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
J. R. Mahoney.
The Physical and Economic Foundation of Natural Resources, No. VI, University Research Committee, University of Utah, 1971. 81 p, 8 fig, 5 tab.

Descriptors: *Photosynthesis, *Water supply, *Plant physiology, Water utilization, Management, Water resources development, Water policy.

Advances in the knowledge of the process of photosynthesis have provided the beginnings of a scientific base for the economics of water use. This most vital process, in which green plants use water, carbon dioxide from the atmosphere, and various mineral elements from the soil, is driven forward by the radiant energy of the sun to manufacture all of the products used by plants and, directly or indirectly, those used by animals. For the most part, the economic implications of photosynthesis have been ignored. This neglect is particularly surprising in the face of numerous and costly projects for the management of water resources. To partially offset this previous neglect, several features of the earth's water resources are examined in fifteen short papers. Seven papers discuss the basic elements of the photosynthetic process as it was understood in 1952. The physical basis of water supply and its principal uses are examined by six writers. The supply sources analyzed include evaporation from the sea, rainfall, evapotranspiration, and reclamation from sewage and industrial wastes. The two remaining papers discuss (1) the status of groundwater studies, and (2) the nation-wide water situation. (Settle-Wisconsin)
W72-11594

PUBLIC DOMAIN ADMINISTRATION--A SCIENTIFIC BASIS FOR WATERSHED MANAGEMENT,
Utah Univ., Salt Lake City, Dept. of Economics.
J. R. Mahoney.
The Physical and Economic Foundation of Natural Resources, No. V, University Research Committee, University of Utah, 1971. 63 p, 10 charts, 3 fig, 16 tab.

Descriptors: *Watershed management, *Watersheds (Basins), *Water resources development, Legal aspects, Surveys, Maps, Meteorology.
Identifiers: *Public domain, Data requirements, Catchments.

Several aspects of public land and watershed management are discussed, including (1) the background of public land acquisition, (2) the need for and essential features of an accelerated federal surveying and mapping program, (3) the basic elements of a national water resources basic-data program, (4) the principles of catchment area management, and (5) the meteorological and physical factors affecting water supply. As early as 1950, the U.S. Congress was considering bills which would have provided for an accelerated surveying and mapping program and for a national water resources basic-data program. Unfortunately the outbreak of the Korean War prevented these bills from reaching the floor of Congress and since then similar basic legislation has not been presented for action by the Congress. These bills are reprinted as a guide to future legislation. Also, a set of tables, which are presented for the first time, show quantitative measurements of some physical and economic results of water consumption under present federal public domain management programs. Although these management programs received strong support in a recent report of the Public Land Law Review Commission, the new data suggest that few net benefits are generated under present programs. (Settle-Wisconsin)
W72-11595

DESIGN AND ECONOMICS OF JOINT WASTE-WATER TREATMENT,
Vanderbilt Univ., Nashville, Tenn; and Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 05D.
W72-11597

SOCIO-ECONOMIC CONSIDERATIONS IN WATER RESOURCES PLANNING,
Department of the Environment, Ottawa (Ontario). Policy Research and Coordination Branch.
A. K. Biswas.
Preprint paper presented at American Society of Civil Engineers National Meeting on Water Resources Engineering, Atlanta, Georgia, January 24-28, 1972. 17 p, 1 fig, 17 ref.

Descriptors: *Water resources development, *Planning, *Social aspects, *Environmental control, *Economic efficiency, Reviews, Project planning, Projections, Costs, Governments, Ecology, Management, Public health, Decision making, Regulation, Water pollution control.

Increasing public awareness of environmental problems and our overall social responsibility has added new dimensions to water resources planning. Increasing public participation in decisionmaking will probably be beneficial because often in the past the planners were not aware of the needs and desires of the society, and, consequently, planning decisions have included a rather limited response to new opportunities and lack of sensitivity to public values. However, techniques currently available for effectively integrating public participation in planning are rudimentary and leave much to be desired. Intensive research efforts shoud be directed to this area and also to development of methodologies to build social science models to improve the planning process. Finally, there is a need for better understanding of the dynamic relationship between man and his environment so that balanced long-term development and conservation policies can be pursued. (Woodard-USGS)
W72-11660

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

BENEFIT-ACCURACY RELATIONSHIP FOR SMALL STRUCTURE DESIGN FLOODS,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W72-11215

AN ECONOMIC AND BIOSTATISTICAL ANALYSIS OF THE BAIT FISH INDUSTRY IN THE LOWER COLORADO RIVER,
Nevada Univ., Las Vegas.
For primary bibliographic entry see Field 06B.
W72-11220

WHY METERING MAKES SENSE.
For primary bibliographic entry see Field 03D.
W72-11221

DECOMPOSITION AND MULTILEVEL TECHNIQUES FOR WATER QUALITY CONTROL,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 05G.
W72-11226

FEDERAL COST-SHARING POLICIES FOR WATER RESOURCES,
National Bureau of Standards, Washington, D.C.
H. E. Marshall, and V. L. Broussalian.
Available from the National Technical Information Service as PB-208 304, $6.75 paper copy,

$0.95 in microfiche. National Water Commission Report SBSi72-039, April 1972, 269 p.

Descriptors: *Cost sharing, Cost repayment, Cost allocation, Cost-benefit analysis, Water policy, Federal project policy, Flood control, Irrigation, Water pollution control, *Water resources development, *Multiple-purpose projects, Economics.
Identifiers: *Federal water resources policy, Public finance.

Federal cost-sharing policies for water resources development are examined with respect to their influence on decisions of local beneficiary groups. These influences are analyzed using criteria of efficiency, equity, administrative feasibility and sound financial arrangements. Current cost-sharing policies are found to be deficient. Alternative cost-sharing rules, namely the association rule, benefit sharing rule and single-percentage rule, are compared with existing Federal cost-sharing policies. The association rule, requiring local beneficiaries to share all costs of a project purpose in the proportion that local benefits bear to national benefits at the margin, is generally superior to the other cost-sharing rules examined. (NWC)
W72-11380

PRICING AND EFFICIENCY IN WATER RESOURCE MANAGEMENT,
George Washington Univ., Washington, D.C. Natural Resource Policy Center.
R. K. Davis, and S. H. Hanke.
Available from the National Technical Information Service as PB-209 083, $6.75 in paper copy, $0.95 in microfiche. National Water Commission Report SBS-72-044, December 1971, 283 p. Contract NWC 71-022.

Descriptors: *Prices, *Pricing, Efficiencies, *Public utilities, *Use rates, *Water rates, Water supply, Irrigation, Flood control, Water pollution control, Recreation, Hydroelectric power.
Identifiers: Federal water resources policy.

Pricing policies have been long recognized as potential mechanisms to improve efficiencies in resource use but pricing of water resources for this purpose has not been widely employed in the United States. The study examines the potential for pricing various water resource services including municipal, industrial and irrigation water supplies; sewage collection and treatment; control of losses from flooding; outdoor recreation; use of inland waterways; and hydroelectric power. The study concludes that efficiency in the use of water resource services can be improved through adopting policies of cost-based pricing although the potential varies among services. An econometric pricing policy model is applied to the Washington metropolitan area to demonstrate the relationship between pricing and the need for investment in new water supply facilities. (NWC)
W72-11382

DETERMINATION OF OPTIMUM STORAGE IN DISTRIBUTION SYSTEM DESIGN,
Dallas, City Water Utilities, Tex.
For primary bibliographic entry see Field 04A.
W72-11395

POSSIBLE IMPACT OF COSTS OF SELECTED POLLUTION CONTROL EQUIPMENT ON THE ELECTRIC UTILITY INDUSTRY AND CERTAIN POWER INTENSIVE CONSUMER INDUSTRIES.
National Economic Research Associates, Inc., New York.
For primary bibliographic entry see Field 05G.
W72-11589

PUZZLED ABOUT SURCHARGES. HERE'S HOW DURHAM OPERATES,
North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 05D.
W72-11593

DESIGN AND ECONOMICS OF JOINT WASTE-WATER TREATMENT,
Vanderbilt Univ., Nashville, Tenn; and Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 05D.
W72-11597

6D. Water Demand

THE RIVER BASIN MODEL: DIRECTOR'S GUIDE.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11171

EFFECT OF WATER AVAILABILITY ON MANUFACTURING EMPLOYMENT IN THE TENNESSEE VALLEY REGION,
Tennessee Univ., Knoxville. Coll. of Business Administration.
For primary bibliographic entry see Field 06B.
W72-11208

AN ANALYSIS OF LATENT DEMAND FOR WATER-BASED OUTDOOR RECREATION FACILITIES,
Oklahoma State Univ., Stillwater. Dept. of Geography.
R. D. Hecock, and J. R. Rooney.
Available from the National Technical Information Service as PB-210 809, $3.00 in paper copy, $0.95 in microfiche. Completion Report (1971), 118 p, 39 tab, 12 ref, 5 append. OWRR B-020-OKLA (1).

Descriptors: *Recreation demand, *Recreation facilities, *Water resources development, Management, Income, Life cycles, Oklahoma, Social aspects.
Identifiers: *Latent demand, Leisure.

The extent and character of latent or unfulfilled demand for water-based recreation in Oklahoma are studied. To estimate recreation participation, facility use, and future demand, a household questionnaire was designed and administered to 4,000 Oklahoma households during the summer of 1969. The data gathered concerned trip expenditures, type and amount of participation in several outdoor activities, important decision-making parameters in the selection of facilities, and personal characteristics of the respondent. The survey indicated that about 30 per cent of Oklahoma's families do not participate in any water-based recreation whatsoever. Forty-five per cent did no swimming, and nearly 80 per cent failed to boat. The forces that seemed to be important to this repressed demand included satisfaction levels, life-cycle stage, leisure time availability, money, proximity to resources, and perception of water resource characteristics. Among these variables, income, time, and life-cycle were the most important. These findings have immediate applications for resource managers. Future increases in income and leisure time are likely to substantially increase demand. It is, therefore, important to predict the location and extent of income and leisure time growth so that those resources most affected can be properly altered to meet the demand. (Settle-Wisconsin)
W72-11209

RECREATIONAL OPPORTUNITIES AND COMMUNITY PATTERNS OF NONPARTICIPATION IN WATER-BASED RECREATION IN OKLAHOMA,
Oklahoma State Univ., Stillwater. Dept. of Geography.
For primary bibliographic entry see Field 06B.
W72-11210

RURAL WATER SUPPLIES IN DEVELOPING COUNTRIES,
World Health Organization, Washington, D.C. Pan American Sanitary Bureau.
For primary bibliographic entry see Field 06B.
W72-11211

AN ECONOMIC ANALYSIS OF WATER RESOURCE USE AND USE CONFLICTS OF SELECTED INDUSTRY GROUPS IN ALABAMA WITH RESPECT TO AREA DEVELOPMENT,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 06B.
W72-11218

WHY METERING MAKES SENSE.
For primary bibliographic entry see Field 03D.
W72-11221

THE RIVER BASIN MODEL: MUNICIPAL SERVICES DEPARTMENT.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11271

THE RIVER BASIN MODEL: SCHOOL DEPARTMENT.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11272
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11273

THE RIVER BASIN MODEL: ECONOMIC SECTOR.
Envirometrics, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W72-11274

SYSTEMS APPROACH TO REGIONAL WATER USE AND DEMAND,
Department of Fisheries and Forestry, Ottawa (Ontario).
P. J. Reynolds.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol. 5, Paris, France, p 293-300, Aug-Sept 1971. 1 tab, 25 ref.

Descriptors: *Planning, *Systems analysis, *Water resources development, Water demand, Water resources, Costs, Benefits, Investment, Forecasting, Decision making, Management, Industrial water, Domestic water, Hydroelectric power, Waste dilution, Wildlife, Recreation demand, Demand, Navigation, Bibliographies.
Identifiers: *Regional planning, *Regional water use, Canada, Microanalysis.

Competing demands for water supply, flood control, irrigation, hydropower, recreation, and quality control have increased with the Nation's growth. A critical examination of the availability and the costs and benefits associated with development of each region's water resources is needed. Costs and manpower commitments required to collect and assess water use and demand data can be prohibitive; however, the methods and techniques of the systems approach provide effective ways of improving investment decisions and forecasting alternative futures. The essential steps in water demand forecasting are: (1) regional economic base study; (2) identification of variables relating to each water demand and trend analysis over time; (3) analysis of alternatives for meeting demands (supply functions); and (4) comparison of demand and supply functions and iteration to revise (1), (2), and (3) as necessary. Water demand forecasting serves 2 purposes: (1) provides answers for broad, preliminary policy decisions or for preliminary screening of projects; and (2) aids investment decisions within specific regions. (USBR)
W72-11363

A MODEL ON MUNICIPAL WATER DEMAND: A CASE STUDY OF NORTHEASTERN ILLINOIS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Geography.
S. T. Wong.
Land Economics, Vol 48, No 1, p 34-44, February 1972. 2 tab, 28 ref.

Descriptors: *Municipal water, *Water demand, *Economics, Income, Prices, Temperature, Elasticity of demand, Water supply, Analysis.
Identifiers: *Metropolitan water resources management, *Northeastern Illinois, Municipal water demand function.

Questions related to the economic demand for municipal water are examined including (1) How do price, income and average summer temperature affect the water demand function of Chicago and outside communities over time. (2) What impact do price and income have on the municipal water demand function among the various community groups in time. (3) Is municipal water demand relatively unresponsive to price change. (4) Is the income elasticity of municipal water demand near zero. (5) How do price and income elasticities compare with some previous studies. Data deficiency is a problem for this study. Over time, both income and average summer temperature have a significant impact on Chicago's water demand. While price is found to be insignificantly different from zero, the negative sign of its elasticity coefficient is consistent with consumer behavior theory. The statistical significance of income and average summer temperature on Chicago's water demand function suggests that any attempt to forecast the future demand for water in Chicago ought to take into consideration the household income level and the average summer temperature conditions. While price has no significant impact in Chicago, it was significant for Chicago's outside communities. At a point in time, price and income were found to have a significant impact for the two community size groups: 25,000-over and 10,000-24,999. In general, the results of these analyses lend support to the results of several earlier studies that have estimated price and income elasticities for municipal water demand. (Strachan-Chicago)
W72-11489

COUNTY-WIDE STUDY FORECASTS WATER USE,
North Carolina State Dept. of Water and Air Resources, Raleigh.
J. D. Wray.
Public Works, Vol. 103, No. 2, p 58-62, February 1972. 4 tab, 4 fig.

Descriptors: *Forecasting, *Water users, *Water supply, Population, Agriculture, Industrial water, Water quality, *North Carolina, Domestic waste.
Identifiers: *County water planning, *Wake County (NC).

The rate of water use for all purposes was determined for Wake County, North Carolina in a pilot study conducted by the State Department of Water and Air Resources. Undertaken in 1967, the study was an attempt to establish a rational basis for each quantifiable use and to obtain data that could be projected for forecasting future rates of use not only in Wake County but throughout the state. In Wake County, it is expected that most categories of water use will vary as a function of the population. Water use for irrigation has a large potential. If farm acreage is not significantly absorbed by urban growth and the market improves, it is estimated that over 14 billion gallons might be used during dry years by 2020. Livestock watering should decline slightly over the next fifty years. Industrial use forecast was 17 billion gallons for Wake County and 9 billion gallons for Raleigh in 2020. Institutional and commercial water use will generally vary with population growth. Per capita residential use should increase slowly as lawn watering becomes more popular and more water using appliances are installed. Although the total water loss in municipal systems will increase, the overall percentage loss will be reduced. A decline of one percent of the overall municipal use per decade was predicted. In combining the projections, hydrological conditions were considered because of their significant effect on overall county use. Predictions were made for both dry and wet conditions. Raleigh's water supply is expected to be adequate from a quantitative standpoint, although some questions of quality remain unresolved. (Strachan-Chicago)
W72-11492

WATER AND URBAN DECENTRALIZATION IN NEW SOUTH WALES,
University of New England, Armidale (Australia). Dept. of Geography.
J. Hobbs, and E. Woolmington.
Annals of the Association of American Geographers, Vol. 62, No. 1, p 37-41, March, 1972. 1 fig, 2 tab, 2 ref.

Descriptors: *Water supply, *Water demand, *Urbanization, Water requirements, Water resources development, *Australia.
Identifiers: *New South Wales, *Urban decentralization.

The estimated water needs of a hypothetical decentralized city of 100,000 people in New South Wales, Australia, are related to the water supply characteristics of ten different locations. These locations are Bathurst, Bourke, Casino, Cowra, Dubbo, Grafton, Gunnedah, Tamworth, Wagga Wagga, and Fernbrook. Examination of Newcastle's water supply situation suggests a ratio of 3.7 to 1 for mean annual water discharge to gross annual water demand for an adequate water supply to be available to a new city of 100,000 people. This ratio criterion means that a city of 100,000 people, consuming 4,818 million gallons per annum, requires a mean annual discharge of 17,727 million gallons. This ratio criterion can be relaxed somewhat when the nature of the catchment area is considered. A modified criterion might be based on mean annual discharge per square mile of catchment. Catchment size and the volume and variability of mean annual stream discharge suggest that coastal streams will provide the best water availability potential for decentralized urban development. However, locations such as Wagga Wagga and Albury, which benefit from water control enterprises already undertaken, also have some merit. (Settle-Wisconsin)
W72-11591

WATER DEMAND FORECASTS AND PLANNING MARGINS IN SOUTH-EAST ENGLAND,
London School of Economics and Political Science (England); and Queen Mary Coll., London (England).
J. A. Rees, and R. Rees.
Regional Studies, Vol. 6, No. 1, p 37-48, March, 1972. 6 tab, 7 ref.

Descriptors: *Water demand, *Water supply, *Forecasting, Expenditures, Regression analysis.
Identifiers: *Excess capacity, *Overestimates, *England.

On the basis of its demand forecasts, the Water Resources Board has derived a set of projections of required expenditures on new water supply capacity. Linear regression analysis suggests, however, that the Board's forecasts are well above the demand levels which would be expected from the best estimate and extrapolation of past trends. The Board's estimates overstate future demand for at least four reasons. First, their log-linear estimating equation gave a relatively poor fit to the data. Second, since the Board's aggregate estimates were based on estimates provided by individual water authorities, some double counting of both population increases and industrial developments certainly occurred. A third source of overestimation lies in the assumption made by some water authorities that as a consequence of the licensing and pricing of private abstractions, there would be a significant switch in industrial demands from private to public water supply. Finally, each estimating agency may have built a 'safety margin' into its estimates; however, the aggregate 'safety margin' would be much less than this aggregation of individual estimates. These faulty estimates imply the installation of considerable excess capacity by 1985 which may cost as much as 30 percent of the total project expenditure. (Settle-Wisconsin)
W72-11592

6E. Water Law and Institutions

CRAWFORD V. WEST INDIA CARRIERS, INC. (RIGHT OF UPLAND OWNER TO RECOVER FOR INJURY TO BEACH GROIN).

337 F. Supp. 262-278 (S.D. Fla. 1971).

Descriptors: *Florida, *Judicial decisions, *Barges, *Groins (Structures), Beaches, Hydraulic structures, Structures, Oceans, Atlantic Ocean, Adjudication procedure, Erosion control, Coastal structures, Coastal engineering, Damages, Accidents, Navigation, Navigable waters.

Three actions were filed and consolidated for trial. Suit resulted when a barge being pulled by a tug broke loose and drifted into beach groins owned by a coastal hotel. Plaintiff, salvor, was not allowed a salvage award. Plaintiff, barge owner, did collect for negligence of tug owner. Plaintiff upland owner sued for damage to his beach groins caused by negligence of defendant tug owner and crew of tug. The federal district court, in holding for plaintiffs barge owner and upland owner, ruled that an upland owner has the right to construct groins into the ocean, provided a permit is first obtained from the Corps of Engineers. Furthermore, plaintiff had a property interest in and to the groins which permitted him to claim and recover for damages to the groins resulting from the negligence of the defendant. Proper method of determining damages was cost of repairing the groins less depreciation up to time of collision. (Nielsen-Florida)
W72-11178

A LEGISLATOR'S VIEW OF IMPENDING AMENDMENTS TO THE WATER POLLUTION CONTROL ACT,
Congress, Washington, D.C.; and Senate, Washington, D.C.
For primary bibliographic entry see Field 05G.
W72-11185

PHOSPHATES AND PHOSPHATE SUBSTITUTES IN DETERGENTS (PART 2).
Committee on Government Operations (U.S. House).
For primary bibliographic entry see Field 05C.
W72-11186

ENVIRONMENTAL ACTIVISM: THERMAL POLLUTION--AEC AND STATE JURISDICTIONAL CONSIDERATIONS.
State Univ., of New York, Buffalo.
For primary bibliographic entry see Field 05G.
W72-11193

SFI DIRECTORS RESOLUTIONS--WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, TEMPORARY EXEMPTION OF EPA FROM ISSUANCE OF ENVIRONMENTAL IMPACT STATEMENTS AND NATIONAL ENVIRONMENTAL RESEARCH CENTER.
For primary bibliographic entry see Field 05G.
W72-11196

ENVIRONMENTAL LAW--NATIONAL ENVIRONMENTAL POLICY ACT OF 1969--PROCEDURAL REQUIREMENTS OF THE ACT MUST BE FOLLOWED IN GOOD FAITH--CALVERT CLIFFS' COORDINATING COMMITTEE, INC. V. ATOMIC ENERGY COMMISSION,
A. P. Salloway.
Boston College Industrial and Commercial Law Review, Vol. 13, p. 802-812 (1972). 62 ref.

Descriptors: *Judicial decisions, *Legal aspects, *Legal review, *Nuclear powerplants, Water pollution sources, Environmental effects, Administrative decisions, Decision making, Regulation, Water law, Constraints, Construction, Permits, Competing uses, Nuclear wastes, Powerplants, Federal project policy, Legislation.
Identifiers: *National Environmental Policy Act.

Defendant Atomic Energy Commission granted a construction permit to the Baltimore Gas and Electric Company for construction of the Calvert Cliffs Nuclear Power Plant. Plaintiff Calvert Cliffs' Coordinating Committee sought review of four AEC procedural rules and their application. The Court of Appeals for the District of Columbia, in holding that the Commission's rules and their application did not conform to the provisions of the National Environmental Policy Act, remanded the case to the Commission for rule changes, including further consideration of the environmental impact of the proposed plant. This case note first examines the court's application of NEPA's provisions to the AEC. The required degree of agency compliance under the Act is discussed. The mechanics of compliance in regard to all federal agencies is then analyzed as to when the provisions of NEPA are to be considered and, once considered, how the various data are to be collected and evaluated. The instant decision's implications for judicial review and future federal agency action are discussed. The expanded opportunity for reviewing courts to compel agency compliance with the NEPA is discussed. The 'discretionary' substantive provisions of the Act may be overcome when the good faith of the agency is suspect. (Widman-Florida)
W72-11197

LOCAL WARS ON POLLUTION.
For primary bibliographic entry see Field 05G.
W72-11198

ENVIRONMENT REPORT/EPA AND JUSTICE DEPARTMENT CLASH OVER ANTI-POLLUTION ENFORCEMENT,
For primary bibliographic entry see Field 05G.
W72-11199

RESCUING THE ENVIRONMENT--THE PRESIDENT'S PROGRAM.
For primary bibliographic entry see Field 05G.
W72-11200

GENEVA DISARMANMENT CONFERENCE AGREES ON TEXT OF TREATY BANNING EMPLACEMENT OF NUCLEAR WEAPONS ON THE SEABED,
Congress, Washington, D.C.; and House, Washington, D.C.; and House, Washington, D.C.
J. F. Leonard.
Department of State Bulletin, Vol. 63, p. 362-366 (1970). 5 p, append.

Descriptors: *Nuclear explosions, *International waters, *Treaties, *United Nations, International law, Legal aspects, Nuclear energy, Governments, Governmental interrelations, Administration, Oceans, Foreign countries, Law of the sea, Foreign waters, Water law.

The draft treaty affirms the common interest of mankind in the use of the seabed for peaceful purposes and pursuant to such interest seeks to exclude the seabed from the arms race. The Treaty bans the planting of nuclear weapons or any other weapons of mass destruction from the seabed beyond 12 miles from shore. Structures, launching installations or other facilities for storing, testing or using such weapons would also be banned. Article III establishes procedure for verification and resolution of questions concerning the fulfilment of the obligations assumed under the Treaty. The Treaty further deals with the effect of this Treaty on the Convention on the Territorial Sea; future efforts to develop, amend and discuss the treaty; and ratification and withdrawal procedures. The changes and amendments made from the original draft are examined and their causes and effects explained. Full text of the Treaty is included.
W72-11202

NATO EXPERTS RECOMMEND INTERNATIONAL ACTION ON OCEAN OIL SPILLS,
Department of Transportation, Washington, D.C.
J. A. Volpe.
Department of State Bulletin, Vol. 63, p. 665-669 (1970). 5 p, 1 append.

Descriptors: *Oil spills, *Oceans, *Governmental interrelations, *Environmental effects, *United States, Oil pollution, Oily water, Governments, International commissions, Ships, Navigation, Environmental control, Water quality control, Water pollution effects, Water pollution sources, Water pollution control, Marine biology, Technology.

The NATO Committee on the Challenges of Modern Society held an oil spills conference which was the first major international meeting to deal with the entire range of problems relating to oil spills, including detection, prevention and cleanup. Included is the statement of the U.S. delegate to the Conference. Oil currently dumped into the seas is an immediate danger to health, recreation and welfare of mankind and ocean life. Present knowledge of the exact effect of oil pollution is rudimentary. The United States has taken steps to prevent pollution by the passage of the National Environmental Policy Act and the Water Quality Improvement Act. The U.S. proposes that NATO nations resolve to achieve by mid-decade a complete halt to all intentional discharge of oil into the oceans by tankers and other vessels. Further the government recommends the following steps toward abatement of discharges: acceleraion of research into effects of oil spills, development of technology to prevent spills and of methods to remove oil once it is in the ocean, more effective international ship construction standards, and international plans for coping with spill contingencies. The text of the resolution adopted at the meeting is included. (Ilkson-Florida)
W72-11203

DRAFT U.N. CONVENTION ON THE INTERNATIONAL SEABED AREA: U.S. WORKING PAPER SUBMITTED TO U.N. SEABEDS COMMITTEE,
Department of State, Washington, D.C.
J. R. Stevenson, and C. H. Phillips.
Department of State Bulletin, Vol. 63, p. 209-218 (1970). 10 p.

Descriptors: *Law of the Sea, *Treaties, *Oceans, *United Nations, International waters, Ecology, International law, Legal aspects, Exploitation, Exploration, Mineral industry, Administration, Navigation, Beds, Beds under water, Environmental control, Economics, International commissions, United States, Regulation.

President Nixon proposed that nations should by international agreement renounce their sovereign rights in the seabed under the high seas beyond a water depth of 200 meters. The draft convention is designed to achieve the President's goals that will save over two-thirds of the earth's surface from national conflict and rivalry, protect it from pollution, and put it to use for the benefit of all. This will require a system of law generally respected by the international community to deal equitably with a wide variety of national and international interests. The radical departure from the traditional law of the sea was intended. Some of the highlights of the draft convention are: a declaration that the area beyond the 200 meter isobath is the common heritage of mankind; no state has any right to such area beyond that provided by the convention; such areas will be open to use by all states, exclusively for peaceful purposes; revenues developed from the area will be used to aid developing nations; the development of the area will be regulated and the environment protected; and the establishment of the International Seabed Resource Authority to implement the provisions of the convention. Basic provisions of the convention are summarized. (Ilkson-Florida)
W72-11204

U. S. DRAFT ARCTICLES ON TERRITORIAL SEA, STRAITS, AND FISHERIES SUBMITTED TO U.N. SEABEDS COMMITTEE,
Department of State, Washington D.C.
J. R. Stevenson.
Department of State Bulletin, Vol. 65, p. 261-268 (1971). 8 p, 1 append.

Descriptors: *Law of the sea, *Straits, *Fishing, *Treaties, *International waters, International Law, Oceans, Fisheries, Regulation, Navigation, Communication, Legal aspects, United Nations, Exploitation, Environmental effects, Water pollution, Economics, Migration, Administration, Fish, Fish management.
Identifiers: *Coastal waters.

Freedom of the seas is an essential prerequisite for communications and defense. Technological changes and more intensive use of the oceans require new agreements revising the regime of the high seas as it applies to some uses of the oceans. The first acticle presented would establish a maximum breadth of 12 miles for the terrtorial sea. However, such extension would place many important straits totally within the territorial sea of riparian states, thereby impairing freedom of navigation and overflight on the high seas. Hence, the second article provides for the right of free transit for vessels and aircraft through all international straits overlapped by territorial seas. Territorial waters in straits would retain national character, subject only to the right of free transit. Many states bordering straits are concerned with pollution from shipping. Since this problem is not unique to straits it requires specific international agreements. The third article is concerned with fishing and specifies fishing in the high seas shall be regulated by international (including regional) fisheries organizations. Other provisions concern prohibition of overfishing certain stocks; protection of coastal states' economic interest while allowing others to fish on the high seas; problems of migratory stocks; and enforcement, research and development, and dispute settlement. (Ilkson-Florida)
W72-11205

LEGAL REGULATION OF MINERAL EXPLOITATION IN THE DEEP SEABED,
Department of State, Washington, D.C.
J. R. Stevenson.
Department of State Bulletin, Vol. 65, p. 48-55 (1971). 8 p.

Descriptors: *International commissions, *Treaties, *International law, *International waters, Exploration, Exploitation, Mineral industry, Mining engineering, Technology, Oceans, Governmental interrelations, Legal aspects, Law of the sea, Economics, United States, Political aspects, Political constraints, Resources development, United Nations.

A gap has emerged between the capability to exploit mineral resources in the deep seabed and the establishment of an effective and stable legal regime. Accompanying this technological capabili-

ty, a political trend of economic nationalism regarding control over ocean resources has been growing among developing nations. The fundamental objective of the United States is to accomodate the interests of all states to promote development of the minerals of the deep seabed while maintaining the freedom of the seas. To promote this policy President Nixon has proposed that the breadth of the territorial sea be established at 12 nautical miles coupled with guaranteed free transit through international straits, and indicated the need for carefully defined fishing rights for coastal states on the high seas beyond 12 miles. In addressing himself to control over mineral resources, the President divided the ocean floor into two areas. First, coastal states would maintain their sovereign rights to the natural resources to a depth of 200 meters. Second, coastal states, under the regulation of an international regime, would licence exploration and exploitation of the resources in a zone beyond 200 meters as trustees for the international community. The proposed organization to administer this plan would consist of the Assembly, a plenary organ; the Council, a small executive order; the Tribunal, a judicial organ; and three commissions to carry on the day-today work. (Ilkson-Florida)
W72-11206

SEABEDS ARMS CONTROL TREATY TRANSMITTED TO THE SENATE,
Executive Office of the President, Washington, D.C.
R. Nixon, and W. P. Rogers.
Department of State Bulletin, Vol. 65, p. 185-187 (1971). 3 p.

Descriptors: *Oceans, *Treaties, *Nuclear explosions, *International law, *International waters, Legal aspects, United Nations, Governmental interrelations, Federal government, Law of the sea, Nuclear energy, Governments, United States, Legislation, Nuclear wastes, Foreign countries.

President Nixon and Secretary of State Rogers transmitted to the Senate the Seabed Arms Control Treaty. The Treaty would prohibit the emplacement of nuclear weapons and other weapons of mass destruction on the seabed beyond the outer limits of a 12-mile coastal 'seabed zone' defined by the Treaty. The prohibition would also extend to structures, launching installations, mines or other facilities designed to use nuclear weapons. The Treaty would not affect failities for research or commercial exploitation not designed specifically for using weapons of mass destruction. Peaceful nuclear explosions, scientific research or other obligations for nuclear explosions, scientific research or other obligations for nuclear energy would not be within the prohibitions of the Treaty. The Treaty also defines 'seabed zone' as an area whose outer limit shall be coterminous with the 12-mile outer limit of the zone described in Part II of the Convention on the Territorial Sea and the Contiguous Zone Sizned in Geneva on 29 April 1958. (Ilkson-Florida)
W72-11207

CLEAN WATER: AFFLUENCE, INFLUENCE, EFFLUENTS, A DESIGN FOR WATER QUALITY MANAGEMENT.
For primary bibliographic entry see Field 05B.
W72-11219

MODELING PROBLEMS AND PROBLEM AVOIDANCE IN WATER RESOURCE MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Graduate School of Business and Public Administration.
For primary bibliographic entry see Field 06A.
W72-11225

ILLINOIS V. CITY OF MILWAUKEE, WISCONSIN (POLLUTION OF INTERSTATE WATERS INVOLVES FEDERAL QUESTION UNDER FEDERAL COMMON LAW).

92 S. Ct. 1385-1395 (1972).

Descriptors: *United States, *Federal jurisdiction, *Navigable waters, *Common law, Jurisdiction, Pollution abatement, Federal government, Legal aspects, Judicial decisions, Local governments, State governments, Water law, Water pollution, Municipal wastes, Legislation, Lake Michigan, Water resources.

Plaintiff state of Illinois filed suit against four Wisconsin cities and two local sewerage commissions to abate alleged pollution of Lake Michigan. Plaintiff alleged defendants discharged inadequately treated sewage and other waste materials into the Lake. Plaintiff sought to invoke the original jurisdiction of the United States Supreme Court. After noting that rights in interstate streams and navigable waters have been recognized as presenting federal questions, the Court held that since federal courts fashion federal law where federal rights are concerned, there is a federal common law dealing with air or water in their ambient or interstate aspects. Thus in a public nuisance action for water pollution of interstate waters federal law governs, although state standards may be relevant. A state with high water quality standards may ask that its standards be honored and that it not be compelled to lower its standards. Therefore the Supreme Court remanded the case to the appropriate district court for resolution of a federal question. (Brackins-Florida)
W72-11259

HISTORY OF FEDERAL WATER RESOURCES PROGRAMS, 1800-1960.
Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 06B.
W72-11276

WASTEWATER MANAGEMENT PROJECT MUSKEGON COUNTY, MICHIGAN,
Illinois Univ., Chicago. Center for Urban Studies.
For primary bibliographic entry see Field 03F.
W72-11381

WATERSHED PLANNING.
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W72-11439

ACTION NOW - A VIEW FROM CHICAGO,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 05F.
W72-11477

THE PUGET SOUND SULPHITE PULP MILLS AND THE TRAGEDY OF THE COMMONS,
Western Washington State Coll., Bellingham. Dept. of Biology.
For primary bibliographic entry see Field 05G.
W72-11478

ISAIAHS AT THE BAR: ENVIRONMENTALISTS AND THE JUDICIAL PROCESSES,
Davies, Biggs, Strayer, Stoel, and Boley, Portland, Oreg.
J. P. Rogers.
Land and Water Law Review, Vol 7, No 1, p 63-72, 1972. 23 ref.

Descriptors: *Environmental effects, *Judicial decisions, *Legal aspects, Regulation, Jurisdiction, Administration, Planning.
Identifiers: *Environmentalists, *Litigation, 'Crank litigation', Injunction, Administrative appeal, Policy making.

The judicial processes, particularly of the federal courts, have been used and abused in the name of 'ecology' or 'environmental degradation' to the extent that those processes themselves, the national health and welfare, and the division of the government into legislative, executive, and judicial confines, are all in danger. The practical effect of the scores of environmental cases which have been thrust upon the national community in the past six years is that there simply are no available protections of consequence against inordinate delay or 'crank' litigation. Assurances that the processes of the law can weed out the harmful effects of these reports to the court are not borne out by practical experience. Faced with the prospect of such inordinate delay in litigation, the business whose project is attacked may decide to abandon it, whether or not the defendants prevail in the end. If the courts are not to overextend themselves in the environmental litigation field, a limitation of the federal judiciary's jurisdiction must be Congressionally imposed. All jurisdiction to hear and determine the right of injunction should not be removed. One qualification should be that where administrative review is provided for, the federal courts may not take jurisdiction until the right of administrative appeal has been exhausted. Review of such action should be made before the administrative agency, and then only to the appropriate United States Court of Appeal. In this way, judicial, legislative, and administrative chaos will be avoided. (Strachan-Chicago)
W72-11482

LEGAL AND POLITICAL CONDITIONS OF WATER RESOURCE DEVELOPMENT,
Indiana Univ., Bloomington.
V. Ostrom, and E. Ostrom.
Land Economics, Vol 48, No 1, p 1-14, February 1972. 2 fig, 18 ref.

Descriptors: *Legal aspects, *Political aspects, *Water resources development, Engineering, Feasibility, Decision making, Planning, California.
Identifiers: *West Basin (Calif), Externalities, Market mechanisms, Interdependency.

In recognizing the union of relationships involved in the engineering of works and the engineering of institutions for water resource development, five sets of criteria become relevant to decision making. They are: technical feasibility, economic feasibility, financial feasibility, legal feasibility, and political feasibility. The groundwater basin management program in West Basin, California is illustrative of the legal and political strategies involved in reallocating decision making capabilities among a community of water users under changing conditions of supply and demand. Technical solutions are dependent upon the formulation of political solutions. The theory of market mechanics in economics permits the anticipation of where market arrangements can be used to advantage and where market weaknesses and market failure will occur. The high degree of interdependency among joint and alternative uses characteristic of water resource development poses special problems associated with externalities, the theory of public goods, common properties, and the organization of collective decision rules. A central task for water resource developers will be one of conceptualizing appropriate institutional solutions which will take account of the heterogeneous sets of interest involved among diverse communities of water users. The collaboration of engineers, lawyers, economists, and political scientists is called for. (Strachan-Chicago)
W72-11484

PROLOGUE: ENVIRONMENT AND THE QUALITY OF POLITICAL LIFE,
California Univ., Santa Cruz. Dept. of Political Science.
G. McConnell.
In: Congress and the Environment, University of Washington Press, 1970. p 3-15. 5 ref.

Descriptors: *Environment, *Conservation, *Political aspects, Social aspects, Economics, Values, Planning.
Identifiers: *Conservation movement.

Some historical background of conservation is presented. The term 'conservation movement' dates from 1908. By 1954, what had been a strong political force in the country had disintegrated. The present conservation movement rests on a strong popular base. The popular base results from a change in values. Issues which were previously considered to be a matter for localities have become increasingly the concern of outsiders. Most importantly, a deep and general change has occurred in our national political life. Fear of tomorrow has been removed. As the nation has become richer, economic values have lost their old urgency, and other important matters, e.g., beauty and wilderness, have emerged and taken the foreground. The striking evidence of growth in the conservation movement since 1954 is directly related to the clarity with which the conservation leaders of today have perceived the strategic nature of conservation issues. The fact that today's movement is principled has contributed to the growth of the movement. The leaders of the modern conservation movement must expect to be told that they are unreasonable. The conservation movement will have to succeed as a movement, enduring all the committee meetings, the endless work of organization, and hammering out the principles and the applications of these principles. (Strachan-Chicago)
W72-11494

WATER PROJECTS AND RECREATION BENEFITS,
Oregon State Univ., Corvallis. Dept. of Geography.
K. W. Muckleston.
In: Congress and the Environment, University of Washington Press, 1970. p 112-129. 13 ref.

Descriptors: *Water, *Recreation, *Project planning, *Benefits, *Institutional constraints, Federal government, Management, Environment, Legislation.
Identifiers: *Policy making, Implementation.

The Federal organization of and responsibility for water resource management has responded poorly to the changes in the public's environmental outlook. The traditional ad hoc and fractionalized approach continues, often at the expense of broader environmental considerations. The present system of water management embodies three interrelated characteristics which render a balanced approach to water management exceedingly difficult, i.e., the committee system, the constituency-orientation of Congress, and the pork barrel. The U.S. Corps of Engineers and the Bureau of Reclamation are discussed. The Federal Water Project Recreation Act exhibits many of the weaknesses inherent in the existing system of policy formation, although it is not without merit. Legislative recognition is given to the idea that recreation, fish, and wildlife values must share equal consideration with the tradition and utilitarian benefits from water development. The impact of the act depends upon its implementation. The specific nature of the act's impact on the environment is debatable. In some cases, implementation will have a marked favorable influence on traditionally nonutilitarian values. On the other hand, the construction agencies may be using provisions of the act to manipulate benefit-cost analysis at the expense of some valuable wilderness recreation areas and other aesthetic values. The major weakness of the act is that the construction agencies may interpret it as a mandate to continue recommending projects as long as they can sell them to a nonfederal unit of government. (Strachan-Chicago)
W72-11495

WATER QUALITY: A QUESTION OF STANDARDS,
Washington Univ., Seattle. Dept. of Geography.
P. P. Micklin.
In: Congress and the Environment, University of Washington Press, 1970. p 130-147. 21 ref.

Descriptors: *Water quality control, *Standards, *Water quality act, Conservation, Legislation, Pollution abatement, Legal aspects, Planning.
Identifiers: *Policy making, Enforcement, Federation.

Adequacy of the Water Quality Act of 1965 to resolve the water pollution problem in the U.S. and the whole approach to waste management it symbolizes are discussed. The Act is a milestone in Federal conservation legislation. It continued and expanded earlier congressional policy, while breaking new ground. For the first time, an organization charged solely with water pollution control was established at the Federal level, and the Federal government was empowered to take an active role in formulation and enforcement of water quality standards. The provision of the Act which requires states to develop water standards for interstate waters is an effective tool. Enforcement of water quality standards may be more difficult. (1) Initial enforcement responsibility remains with the states. (2) There are ambiguities in the enforcement procedures. The law is not a final solution to the water pollution problem in the U.S. Congress should be considering the interrelations and ramifications of water, air, and land pollution to avoid piecemeal legislation. Legislative responsibility regarding water, water pollution, and waste disposal problems is fragmented among numerous committees, and this militates against rational systematic action in these matters. The concept of federalism may be an even great barrier to the institution of a viable water pollution control program. Congress has been forced to write legislation to satisfy constitutional strictures rather than to create the most effective program. Some innovative legislative approaches are in order. (Strachan-Chicago)
W72-11496

WILD AND SCENIC RIVERS: PRIVATE RIGHTS AND PUBLIC GOODS,
Washington Univ., Seattle. Dept. of Geography.
D. G. Asmussen, and T. P. Bouchard.
In: Congress and the Environment, University of Washington Press, 1970. p 163-174. 12 ref.

Descriptors: *Wild rivers, *Public benefits, Legislation, Planning, Decision making, Pollution abatement, Funding, Recreation.
Identifiers: *Wild and Scenic River Act (1968), *Private rights, Implementation.

The Wild and Scenic Rivers Act (1968) suggests that the public good, by virtue of an expanding population and a scarcity of recreation opportunities, must someday transcend the private property rights of the few. A more familiar issue in the controversy over wild rivers legislation is that of development versus nondevelopment. A history of wild rivers legislation is presented. This legislation now faces the challenges of implementation. One problem is the procedure for the addition of a river to the system. The partnership of private development interests and the Federal water agencies interested in serving them (Corps of Engineers, Bureau of Reclamation, and Federal Power Commission) could well eliminate the possibility of including rivers in regions having potential for irrigation, dam construction, or electric power generation. An additional problem in implementation of the act may result from the weak safeguards against pollution. Funding for land acquisition presents yet another problem. However, the wild rivers legislation has some new and encouraging implications for public recreation. Recreational use of water resources has traditionally been a secondary consideration. Private property rights have been legislatively challenged. Private property stands in the face of all but the most utilitarian social welfare needs. (Strachan-Chicago)
W72-11497

NATIONAL POLICY FOR THE ENVIRONMENT: POLICIES AND THE CONCEPT OF STEWARDSHIP,
Washington Univ., Seattle. Dept. of Political Science.
G. Wandesforde-Smith.
In: Congress and the Environment, University of Washington Press, 1970. p 205-226. 17 ref.

Descriptors: *Environment, *Political aspects, Federal government, Planning, Decision making, Ecology, Ethics, Economics, Management, Legislation, Institutions.
Identifiers: *Policy making, *Stewardship, *National policy for the environment, Responsibility.

The main objective of a national policy for the environment is to create within the Federal government a point at which responsibility for the total environment can be fixed. Despite an array of informal coordinating mechanisms, the Federal government is presently committed to a problem-by-problem approach to environmental policy. The case for establishing a national policy for the environment rests upon two basic premises. (1) The relationship between man and the environment cannot be adequately understood or effectively managed except as a highly complex, seamless web of ecological relationships. (2) There is a definite ethical basis to a national environmental policy, centered around the Federal government's role as the protective custodian of the environment for posterity. A national policy for the environment amounts to more than the preservation of natural environments or the management and use of natural resources according to an economical or ecologically optimal model. A brief history on environmental legislation is given. The history of efforts to establish a national environmental policy indicated than when the President is unable or unwilling to act, Congress must take the lead in determining whether the ends served by environmental policy will improve human well-being. This task requires institutional arrangements that reach out to larger and more inclusive ends. (Strachan-Chicago)
W72-11498

CONCLUSIONS: CONGRESS AND THE ENVIRONMENT OF THE FUTURE,
Washington Univ., Seattle.
R. A. Cooley, and G. Wandesforde-Smith.
In: Congress and the Environment, University of Washington Press, 1970. p 227-243. 12 ref.

Descriptors: *Environment, *Planning, *Decision making, *Legislation, Evaluation, Federal government, Institutions, Political aspects.
Identifiers: *Congress, *Policy making, Committee system.

The central problem is whether or not the American political system, and especially Congress, can deal effectively with both a wide range of specific environmental issues and with the larger challenge of providing the nation with a meaningful public policy for the environment. The major conclusion is that Congress has failed to do more than make halting progress through a series of incremental adjustments. The congressional committee system hinders the careful evaluation of environmental legislation. The present, highly fragmented committee system favors special, frequently economic, interests at the expense of giving adequate recognition to the full range of values and interests to be served by environmental policy. Senior congressmen have failed to press for reorganization of committees with jurisdiction over environmental legislation. The committee structure tends to place tremendous power in the hands of a few congressmen. A FURTHER CONSEQUENCE OF THE POOR ORGANIZATION OF Congress is that Congress is placed at a disadvantage when dealing with the executive branch. Congress has refused to face up to the need for governmental reorganization in the executive

branch to reduce the highly diffuse and fragmental system of decision making. Little is known about the policy consequences of alternative institutional arrangements for achieving environmental policy goals in the executive and legislative branches. (Strachan-Chicago)
W72-11499

ENVIRONMENTAL QUALITY AS A PROBLEM OF SOCIAL CHOICE,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 05G.
W72-11503

LEGAL STRATEGIES APPLICABLE TO ENVIRONMENTAL QUALITY MANAGEMENT DECISIONS,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 05G.
W72-11504

POWER STRUCTURE STUDIES AND ENVIRONMENTAL MANAGEMENT: THE STUDY OF POWERFUL URBAN PROBLEM-ORIENTED LEADERS IN NORTHEASTERN MEGALOPOLIS,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 05G.
W72-11505

SIMPSON V. IOWA STATE HIGHWAY COMMISSION (RIPARIAN LANDOWNER'S RIGHT TO DAMAGES FOR CONDEMNATION OF MINERAL CONTENT).

195 N.W.2d 528-541 (Iowa 1972).

Descriptors: *Iowa, *Condemnation value, *Gravel, *Easements, Mineralogy, Quarries, Riparian rights, Flood plains, Floodways, Legal aspects, Judicial decisions, Land tenure, State jurisdiction, Eminent domain, Non-navigable waters, Condemnation, Public rights, Bridges, Jetties.
Identifiers: *Lateral support.

Appellant State Highway Commission appeals an award of damages to appellee landowning partnership for condemnation losses. Appellant had constructed a bridge across the Maple River, a nonmeandered, nonnavigable stream and required 2.8 acres of appelle's land for a jetty. The land was part of a 27 acre quarry which appellee owned. Appellee also owned part of the streambed. Appellant contended that it was improper for the court to award damages based on the mineral content of the 2.8 acres because said land was part of the flood plain and removal of gravel would be prohibited. The Supreme Court of Iowa held that in a condemnation action damages properly include mineral content, but that the State Highway Commission should have been permitted to introduce evidence showing that the state Natural Resources Council would not permit gravel removal in a flood plain and to show whether or not the condemned land was within such a flood plain. The court also ruled that appellee's duty to provide lateral support for an adjacent landowner did not extend to a newly constructed bridge. Therefore the duty to furnish lateral support did not prevent compensation for mineral content. (Grant-Florida)
W72-11515

UNITED REIS HOMES V. PLANNING BOARD OF NATICK (VALIDITY OF BOARD OF HEALTH REGULATIONS CONTROLLING LOT DRAINAGE).

270 N.E.2d 402-405 (Mass. 1971).

Descriptors: *Massachusetts, *Judicial decisions, *Drainage water, *Drainage effects, *Public health, Drainage systems, Pipes, Habitats, Mosquitoes, Environmental engineering, Legal aspects, Pest control, Safety, Streams, Drainage, Water law.

Plaintiffs, owners of subdivision property, appealed from decision of defendant, planning board, claiming that requirements placed on land were unreasonable. The plaintiffs owned tract of land and filed with the planning board a proposed subdivision plan. The board approved the plan subject to board of health requirements that a brook running through the site be piped underground and that certain lots be filled in with gravel to a required distance. Plaintiff contended that such requirements were unreasonable and ultra vires. The defendant maintained that an open brook in an inhabitated area becomes a public health problem, a breeding place for vermin and mosquitoes, and that the safety and health of the inhabitants required these items as conditions of approval. The Supreme Judicial Court of Massachusetts, in affirming the planning board requirements, stated that the board of health has statutory authority to control and direct lot drainage and that the requirements in the instant case were not unreasonable. (Nielson-Florida)
W72-11517

KALUR V. RESOR (VALIDITY OF REGULATIONS AUTHORIZING DISCHARGES INTO NAVIGABLE WATERS).
335 F. Supp. 1-15 (D.C. 1971).

Descriptors: *United States, *Judicial decisions, *Waste disposal, *Rivers and Harbors Act, *Permits, *Navigable waters, Navigable rivers, Nonnavigable waters, Regulation, Administrative agencies, Wastes, Legislation, Legal aspects, Supervisory control (Power), Federal jurisdiction, Industrial wastes.
Identifiers: *National Environmental Policy Act, *Refuse Act.

Plaintiff private citizens and conservation groups sought injunctive relief with respect to regulations promulgated by defendant Army Corps of Engineers, the Secretary of the Army, and the Administrator of the Environmental Protection Agency, under the Rivers and Harbors Act (Refuse Act) and National Environmental Policy Act. The contested regulations prescribed policy and procedure to be followed in issuing permits authorizing discharges in navigable waters or tributaries emptying into navigable water. Plaintiff contended that the defendants exceeded their statutory authority by issuing permits under such regulations authorizing discharges in non-navigable waters. They also alleged that defendants' regulations did not comply with NEPA's requirement of a detailed environmental impact statement. The court, in granting plaintiffs' motion for summary judgement, held the regulations were ultra vires and of no effect insofar as they purported to allow the issuance of permits to discharge refuse matter into non-navigable waterways. Following the reasoning in Calvert Cliffs V. A.E.C. the court further ruled that permits issued under the Refuse Act are not exempt from NEPA's environmental impact statement requirement. (Nielson-Florida)
W72-11518

PITMAN V. UNITED STATES (RIGHT OF THE UNITED STATES TO ALTER LITTORAL FLOW).

457 F.2d 975-978 (Ct. Cl. 1972).

Descriptors: *Florida, *Navigable waters, *Riparian rights, Littoral drift, Legal aspects, Water law, Constitutional law, Easements, Accretion (Legal aspects), Land tenure, Public rights, Littoral, Sediment transport, Jetties, Harbors, Ocean currents, Accelerated erosion, Beach erosion, Atlantic Ocean.
Identifiers: *Tucker Act.

Plaintiff, littoral landowner sued the United States for damages resulting from an alleged taking of 4 acres of beachfront property without compensation. Plaintiff contended that defendant's construction of two seaward extending jetties at Cape Canaveral, Florida, interrupted the normal littoral drift of the Atlantic Ocean, thereby causing erosion of his littoral land to the south of the jetties. Since 1954 the beach had been receding. Plaintiff acquired the property in 1957. The United States Court of Claims held that the United States has a dominant servitude in the flow of a navigable waterbody and that a riparian or littoral landowner's right to have navigable waters come to him unchanged applied only against other riparian or littoral landowners and not against the United States. The court also held that plaintiff could not recover on the theory that his land had been permanently inundated because there was no showing that defendant had raised the level of the ocean. The court ruled that damages were not recoverable for the erosion since it was purely consequential and therefore not actionable. The court further ruled that plaintiff had no right to the prevention of erosion value of the littoral flow since it inhered in the flow of water, which defendant was entitled to interrupt. (Grant-Florida)
W72-11519

FLORIDA AIR AND WATER POLLUTION CONTROL COMMISSION V. ST. REGIS PAPER COMPANY (PROCEDURE FOR ASSESSING POLLUTION PENALTIES PURSUANT TO FLORIDA AIR AND WATER POLLUTION CONTROL ACT).

257 So.2d 253-256 (Fla. 1971).

Descriptors: *Adjudication procedure, *Florida, *Administrative agencies, *Administrative decisions, *Penalties (Legal), Legal review, Legal aspects, Administration, Legislation, Oil pollution, Water pollution control, Judicial decisions, Water pollution, State governments, Industrial wastes.
Identifiers: *Florida Air and Water Pollution Control Act.

Plaintiff state agency brought action to collect penalties incurred by defendant paper company's alleged oil discharge into a river. Defendant sought to dismiss on the ground that the Commission had failed to properly exhaust its administrative remedies. The District Court dismissed the complaint, rejecting the Commission's contention that it could treat violations either as an administrative matter or move directly against a violator in court. The Supreme Court of Florida affirmed and held that the penalty stage under the Florida Air and Water Pollution Control Act can not be reached until the alleged violator is given notice and the opportunity to be heard before the Commission. Once the due process safeguards are met and liability assessed, the Commission is then free to initiate judicial action to impose penalties. This litigation did not foreclose further Commission action in accordance with proper procedures. (Ilkson-Florida)
W72-11520

U.S. GIVES VIEWS ON CONVENING CONFERENCE ON LAW OF THE SEA,
Department of State, Washington, D.C.
W. P. Rogers.
Department of State Bulletin, Vol. 63, p. 38-39, (1970).

Descriptors: *Environmental effects, *Law of the sea, *United Nations, *International commissions, United States, International waters, International law, Governments, Exploration, Exploitation, Boundaries (Property), Straits, Fisheries, Legal aspects, Treaties, Foreign waters, International Joint Commission.

The United States strongly supports codification of international law especially as reflected by the

developments on the law of the sea. The United States is pleased with the continuing work of the United Nations in the establishment of the Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction. Future conferences on the law of the sea should consider the questions of the breadth of the territorial sea and the regime for the exploration and exploitation of the seabeds outside the national jurisdiction. The protection of the environment, and particularly the prevention of pollution, must occupy a major role in the future development of the international law of the sea. The United States believes that the procedures for the resolution of these issues should be structured so as to assure that each issue receives appropriate attention which will facilitate its examination and enhance the opportunity for agreement. The Secretary General is urged to bring before the General Assembly those issues previously discussed and to have the Committee on Peaceful Uses of the Seabed accelerate the development of a regime for exploitation. (Ilkson-Florida)
W72-11521

ENVIRONMENT IN THE COURTROOM,
Michigan Univ., Ann Arbor. School of Law.
For primary bibliographic entry see Field 05G.
W72-11522

POLLUTION POLITICS.
For primary bibliographic entry see Field 05G.
W72-11523

STATES JOIN THE POLLUTION BATTLE,
For primary bibliographic entry see Field 05G.
W72-11525

THE NATIONAL WATER COMMISSION ANNUAL REPORT FOR 1971.
National Water Commission, Washington, D.C.

For Sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price $0.35. Interim Report No. 3, December 31, 1971, 25 p, 4 append.

Descriptors: *Water management (Applied), *Administrative decisions, *National Water Commission, *Federal government, Comprehensive planning, Administration, Planning, Water allocation (Policy), Water rights, Coordination, Legal aspects, Administrative agencies, Water law, Social aspects, Institutions, Watersheds (Basins), Interstate compacts.

The National Water Commission was established to study national water resource problems, to consider consequences of water resource development, to provide advice on water resource matters, and to prepare reports and recommendations for the President and the Congress. Minutes of meetings held during 1971 and descriptions of completed reports dealing with such topics as future water demands, metropolitan water management, precipitation modification, wastewater reuse, ground-water management, federal-state relations in water law, and metropolitan water institutions are included. Also included are brief reports on appropriation law, improvement of state water right records, law of interbasin transfers, market transfers of water rights, the Federal-State Regional Corporation, interstate water compacts, hydroelectric power policy, potential technical advances and their impact on anticipated water requirements, and institutions for water planning. Also discussed are public participation in water resources planning, systems anlaysis, the New England River Basin Commission, legal protection of instream water values, riparian water law, water salvage, public access rights in waters and shorelands, population growth in communities in relation to water resources policy, and administrative allocation of water. (Widman-Florida)
W72-11527

MAGNUSON COASTAL ZONE MANAGEMENT ACT OF 1972.
S. 3507, 92nd Cong, 2nd Sess. (1972). 29 p.

Descriptors: *Legislation, *Estuarine environment, *Coastal plains, *Management, Estuaries, Oceans, Rivers, Wetlands, Coasts, Tidal marshes, Coordination, Land management, Marsh management, Land resources, State governments, Local governments, Federal government.

The bill would establish a national policy and develop a national program for the management, beneficial use, protection and development of the land and water resources of the nation's coastal zones. The bill would encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the preparation and implementation of management programs. The bill provides for annual grants to coastal states to assist in developing a management program which would identify state boundaries of the coastal zone, establish permissible land and water uses, and establish guidelines on priority of uses. The bill also provides for public hearings, rules and regulations, review of management programs, and for the keeping of records on disposition of funds. The bill would create the National Coastal Resources Board and the Coastal Zone Management Advisory Committee. These groups would serve to coordinate programs, mediate in case of disagreement, and advise and consult with officials. The Secretary of Commerce would be authorized to provide grants for acquisition of estuarine sanctuaries. The Secretary would also be required to prepare an annual report on the administration of this Act. (Nielson-Florida)
W72-11528

LEGISLATIVE NEEDS IN WATER--RESOURCES MANAGEMENT IN ALABAMA,
D. M. Grubbs, and H. Cohen.
Alabama University Natural Resources Center, Report 711, 1971. 86 p, 82 ref.

Descriptors: *Legislation, *Alabama, *Water resources development, *Administration, *Adoption of practices, Administrative decisions, Legal aspects, Constitutional law, Common law, Legal review, Riparian rights, Governments, Water resources, Judicial decisions, Water law.

The objective is the identification of legislative action required to place responsibility and authority in the hands of Alabama agencies charged with development and conservation of water resources. Hypotheticals are used to demonstrate existing problems involving riparian rights, ground water use, control of diffused surface water and watercourses, preferences, and eminent domain. National trends in water legislation are reviewed. Interim needs--where the legislature has existing authority to act--include amendments to legislation creating the Alabama Water Well Standards Board, improved flood plain management, coordination of state planning activities, deep well disposal of liquid wastes, preservation of scenic rivers, coordination of water resources research, water-use inventory, coordination of planning activities by removal of inactive state agencies, review of proposed water resources legislation, eminent domain priorities in water management, agency reporting, a water resources information center, pollution control in coastal waters, size limitations on water management districts, and coastal preservation and management. Legislation requiring constitutional amendment includes a declaration that all non-appropriated waters in the natural environment are natural resources, creation of a Water Resources Commission, and a definition of reasonable use in ground water withdrawal. (Widman-Florida)
W72-11536

INTERNATIONAL LAW AND THE PROTECTION OF THE OCEANS FROM POLLUTION,
Fordham Univ., New York.
For primary bibliographic entry see Field 05G.
W72-11552

THE NATIONAL INDUSTRIAL POLLUTION CONTROL COUNCIL: ADVISE OR COLLUDE,
Washington Univ., Seattle.
For primary bibliographic entry see Field 05G.
W72-11553

THE TENNESSEE WATER QUALITY CONTROL ACT OF 1971: A SIGNIFICANT NEW ENVIRONMENTAL STATUTE,
Tulane Univ., New Orleans, La.
J. C. Juergensmeyer.
Vanderbilt Law Review, Vol 25, p 323-330, 1972. 30 ref.

Descriptors: *Water quality control, *Tennessee, *Water permits, *Legislation, Water pollution control, Administrative agencies, State governments, Permits, State jurisdiction, Water resources planning, Long-term planning, Legal aspects, Law enforcement, Water resources development, Water law, Legal review.
Identifiers: *Public trust doctrine.

Tennessee's new Water Quality Control Act is one of the most significant pieces of environmental legislation to be produced in recent years. The salient features of the Act and its efficacy both as basic law for Tennessee and as a model for other jurisdictions are discussed. By adopting the public trust doctrine, the Act provides citizens direct access to relevant administrative agencies. The Act creates the Tennessee Water Quality Control Board as the prime administrative machinery for planning and performance of the state's duties to protect water quality. The Board serves as a reviewing agency for enforcement orders and permits issued by the Commissioner of Public Health. The Act also creates a staff of attorneys to be assigned to the Division of Water Quality Control. The Act also establishes a dual permit system which makes it unlawful for any person to alter the water quality of Tennessee waters without a permit from the commissioner. (Waldron-Florida)
W72-11556

COOPERATIVE COMMUNITY-UNIVERSITY WATER RESOURCE PLANNING: AN INTERDISCIPLINARY APPROACH,
Wisconsin Univ., Green Bay.
For primary bibliographic entry see Field 04A.
W72-11590

SOCIO-ECONOMIC CONSIDERATIONS IN WATER RESOURCES PLANNING,
Department of the Environment, Ottawa (Ontario). Policy Research and Coordination Branch.
For primary bibliographic entry see Field 06B.
W72-11660

6F. Nonstructural Alternatives

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, CATRON COUNTY,
New Mexico State Univ., University Park, Dept. of Agronomy.
For primary bibliographic entry see Field 02G.
W72-11311

6G. Ecologic Impact of Water Development

JAMES BAY,
Department of the Environment, Ottawa (Ontario). Marine Sciences Branch.
For primary bibliographic entry see Field 05B.
W72-11131

THE ENERGY-ENVIRONMENT CONFLICT: SITING ELECTRIC POWER FACILITIES,
Virginia Univ., Charlottesville. School of Law.
M. Willrich.

Virginia Law Review, Vol. 58, p. 257-336 (1972). 193 ref.

Descriptors: *Electric powerplants, *Sites, *Environmental effects, *Decision making, Electric power industry, Federal government, State governments, Administrative agencies, Project planning, Planning, Coordination, Legal aspects, Electric power demand, Electric power production, Environmental control, Powerplants, Legislation.

The conflict between demands for electric power and environmental protection is evident whenever decisions are made concerning the location of electric power facilities. The demand for electricity, the supply alternatives, and the environmental effects of electric power production are examined. This information depicts the magnitude and complexity of the forces that shape, and are shaped by, particular siting choices. The legal framework that presently governs electric facilities siting decisions is outlined and evaluated. A state level decision-making process for siting major electric facilities is developed. Such a process must include policy goals for state siting decisions, electric power supply policy, environmental protection policy, and land use perspective. Participants in electric facilities siting decisions should include the electric utilities, state agencies, and private citizens. The decision-making process concerning the siting of electric power facilities may be divided into two main phases, planning and certification. Planning and certification criteria are discussed. If the initial responsibility of the siting body must be limited to the siting of electric facilities, policies and procedures should be designed for future expansion into other areas of land use regulation. (Widman-Florida)
W72-11172

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W72-11173

FPC PROJECT NO. 1121--BATTLE CREEK HYDROELECTRIC PROJECT, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Pacific Gas and Electric Co., San Francisco, Calif.
For primary bibliographic entry see Field 08C.
W72-11174

GREAT LAKES CONNECTING CHANNELS, WIDENING AND DEEPENING BENDS IN ST. MARY'S RIVER, MICHIGAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 04A.
W72-11175

PROPOSED CHANGE IN THE OPERATION OF THE EXISTING KORTES UNIT OF THE PICK--SLOAN MISSOURI BASIN PROGRAM, WYOMING (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11176

SMITHVILLE LAKE, LITTLE PLATTE RIVER, MISSOURI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08D.
W72-11177

FORT SCOTT LAKE, MARMATON RIVER, KANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08A.
W72-11180

DETAILED PROJECT STUDY OF FLOOD CONTROL IMPROVEMENTS FOR WAIMANO STREAM, OAHU, HAWAII (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 08F.
W72-11182

CEDAR BAYOU, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W72-11183

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, HOPKINS COUNTY IN KENTUCKY, TRADEWATER RIVER RC AND D PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W72-11184

PUGET SOUND OCEANOGRAPHIC RESOURCES.
Committee on Commerce (U.S. Senate). Subcommittee on Oceans and Atmosphere.

Descriptors: *Washington, *Administrative organizations, *Environmental effects, *Oceanography, Estuaries, Pacific Northwest, Pacific Ocean, Marine geology, Political aspects, Social aspects, Grants, Experimental farms, Resource development, Technology, Marine fisheries, Estuarine fisheries, Marine plants, Marine animals, Economic impact, Economic feasibility, Commercial fisheries, Adoption of practices.

Testimony taken before the Senate Subcommittee on Oceans and Atmosphere concerning Puget Sound oceanographic resources is presented. Ocean fishery research by the National Oceanic and Atmospheric Administration (NOAA) is discussed. Also discussed is NOAA's program of oceanographic mapping, pollution study, sea farming, and cost figures relative to future programs. The programs and functions of the Washington Department of Natural Resources in aquatic land management is discussed, including the overlap and conflict of functions with federal agencies. The environmental conflict between industrial use and commercial fishing in Puget Sound is explained. Recommendations include strengthened regional entities of federal agencies, larger federal investments in state projects, long-range growth of the Sea-Grant program, increased impetus to the data buoy program, and support of the national marine fisheries service program. The need for exploration of the ocean shelf off Puget Sound is examined. The unique biological chacteristics of the Puget Sound estuary, the need for a moratorium on oil well drilling, and the need for coordinated development planning are explained. Impacts from the construction of the Alaskan oil pipeline are examined. (Grant-Florida)
W72-11187

LAND AND WATER POLLUTION FROM RECREATIONAL USE.
National Industrial Pollution Control Council, Washington, D.C.
For primary bibliographic entry see Field 05G.
W72-11188

EDEN WATERSHED, MISSISSIPPI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W72-11189

PROPOSED SANTA MARGARITA PROJECT, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11190
For primary bibliographic entry see Field 08A.
W72-11191

WYNOOCHEE DAM AND LAKE, WYNOOCHEE RIVER, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W72-11192

ENVIRONMENTAL ACTIVISM: THERMAL POLLUTION--AEC AND STATE JURISDICTIONAL CONSIDERATIONS.
State Univ., of New York, Buffalo.
For primary bibliographic entry see Field 05G.
W72-11193

CHOCTAWHATCHEE RIVER AND HOLMES CREEK, FLORIDA-PERMIT APPLICATION FOR SNAG REMOVAL BY FLORIDA GAME AND FRESH WATER FISH COMMISSION (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W72-11194

WASTE TREATMENT PROJECT IN SPENCER, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W72-11195

ENVIRONMENTAL LAW--NATIONAL ENVIRONMENTAL POLICY ACT OF 1969--PROCEDURAL REQUIREMENTS OF THE ACT MUST BE FOLLOWED IN GOOD FAITH--CALVERT CLIFFS' COORDINATING COMMITTEE, INC. V. ATOMIC ENERGY COMMISSION,
For primary bibliographic entry see Field 06E.
W72-11197

PALATLAKAHA RIVER WATERSHED, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11201

GENEVA DISARMANMENT CONFERENCE AGREES ON TEXT OF TREATY BANNING EMPLACEMENT OF NUCLEAR WEAPONS ON THE SEABED,
Congress, Washington, D.C.; and House, Washington, D.C.; and House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11202

DRAFT U.N. CONVENTION ON THE INTERNATIONAL SEABED AREA: U.S. WORKING PAPER SUBMITTED TO U.N. SEABEDS COMMITTEE,
Department of State, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11204

U. S. DRAFT ARCTICLES ON TERRITORIAL SEA, STRAITS, AND FISHERIES SUBMITTED TO U.N. SEABEDS COMMITTEE,
Department of State, Washington D.C.
For primary bibliographic entry see Field 06E.
W72-11205

SEABEDS ARMS CONTROL TREATY TRANSMITTED TO THE SENATE,
Executive Office of the President, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11207

INLAND WATERWAY FROM DELAWARE RIVER TO CHESAPEAKE BAY, DELAWARE AND MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 04A.
W72-11260

SECOND POWERHOUSE, BONNEVILLE LOCK AND DAM, COLUMBIA RIVER, OREGON AND WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08C.
W72-11261

COW CREEK WATERSHED, OKLAHOMA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. Watershed Planning Div.
For primary bibliographic entry see Field 08A.
W72-11262

VANDALIA DRAINAGE AND LEVEE DISTRICT (DISTRICT 21), ILLINOIS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 08D.
W72-11263

LAKE FOREST BEACH EROSION, ILLINOIS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 08A.
W72-11264

SUPERVISOR OF THE HARBOR PERMIT PROGRAM FOR WASTE DISPOSAL IN THE ATLANTIC OCEAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 05G.
W72-11265

OCEAN OUTFALL EXTENSION PROJECT, CARMEL SANITARY DISTRICT, CARMEL, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, San Francisco, Calif., and California State Water Control Board, San Francisco.
For primary bibliographic entry see Field 05E.
W72-11266

NAHUNTA SWAMP BASIN, WAYNE AND GREENE COUNTIES, NORTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 08A.
W72-11267

SCAPPOOSE DRAINAGE DISTRICT, OREGON, PROPOSED IMPROVEMENTS, FLOOD PROTECTION (DRAFT ENVIRONMENTAL IMPAC STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08A.
W72-11268

CLARKS FORK--BULLOCKS CREEK WATERSHED, SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W72-11269

WATER RESOURCE PROJECTS AND ENVIRONMENTAL IMPACTS: TOWARDS A CONCEPTUAL MODEL,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 06B.
W72-11385

A NATIONAL SEASHORE PROVES A MIXED BLESSING FOR ITS SURROUNDING COUNTY,
Marshall Kaplan, Gans and Kahn, Sausalito, Calif. S. Fraser.
City, Vol 6, No 1, p 36-44, January-February 1972. 12 photo.

Descriptors: *Conservation, *Environmental effects, *Seashores, Benefits, Degradation, Wildlife conservation, Taxes, Tourism, *California.
Identifiers: *Point Reyes National Seashore, Despoliation, Traffic.

While the Point Reyes National Seashore in Marin County, California was originally considered a victory for the conservationists, there is at present some question as to whether the designation of the Seashore will yield as many problems as benefits to the partly urbanized, partly wild, and partly pastoral suburban county. The unanticipated fallout from the Seashore includes: despoliation of pristine wilderness areas, interference with wildlife habitats, automobile congestion, increased police and other public safety needs, a declining county property-tax base, and tourism run rampant. The proposed Golden Gate National Recreation Area only promises to exacerbate the area's problems. The most visible and highly criticized problem is that of traffic congestion. (Strachan-Chicago)
W72-11481

ISAIAHS AT THE BAR: ENVIRONMENTALISTS AND THE JUDICIAL PROCESSES,
Davies, Biggs, Strayer, Stoel, and Boley, Portland, Oreg.
For primary bibliographic entry see Field 06E.
W72-11482

APPLICATIONS OF ECOSYSTEM THEORY, SUCCESSION, DIVERSITY, STABILITY, STRESS AND CONSERVATION,
Toronto Univ., (Ontario); and British Petroleum Co., Ltd., London (England).
H. A. Regier, and E. B. Cowell.
Biological Conservation, Vol 4, No 2, p 83-88, January 1972. 4 fig, 11 ref.

Descriptors: *Ecosystems, *Succession, *Stability, *Stress, *Conservation, Economics, Exploitation, Pollutants, Ecology, Pollution abatement.
Identifiers: *Ecosystem theory, *Diversity.

Processes at the ecosystem level of organization are examined as they are affected by conventional regimes of fishery exploitation and pollution, the latter including both nutrient and toxic materials. Exploitation and pollution are treated as stresses that deform and transform community structure and reverse the usual sequence of ecological succession with respect to dominance of various tax diversity, stability, and production. Broad economic implications of such processes are outlined. (Strachan-Chicago)
W72-11486

PROLOGUE: ENVIRONMENT AND THE QUALITY OF POLITICAL LIFE,
California Univ., Santa Cruz. Dept. of Political Science.
For primary bibliographic entry see Field 06E.
W72-11494

NATIONAL POLICY FOR THE ENVIRONMENT: POLICIES AND THE CONCEPT OF STEWARDSHIP,
Washington Univ., Seattle. Dept. of Political Science.
For primary bibliographic entry see Field 06E.
W72-11498

CONCLUSIONS: CONGRESS AND THE ENVIRONMENT OF THE FUTURE,
Washington Univ., Seattle.
For primary bibliographic entry see Field 06E.
W72-11499

ECONOMIC GROWTH AND THE NATURAL ENVIRONMENT,
California Univ., Riverside.
For primary bibliographic entry see Field 05G.
W72-11500

A QUANTITATIVE FRAMEWORK FOR RESIDUALS MANAGEMENT DECISIONS,
Resources for the Future, Inc. Washington, D.C.
For primary bibliographic entry see Field 05G.
W72-11501

DISTRIBUTION OF ENVIRONMENTAL QUALITY,
Bowdoin Coll., Brunswick, Me.
For primary bibliographic entry see Field 05G.
W72-11502

VENTURA MARINA, VENTURA COUNTY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 08A.
W72-11507

BETHEL SMALL-BOAT HARBOR, BETHEL, ALASKA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 04A.
W72-11508

FALMOUTH LAKE, LICKING RIVER, KENTUCKY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 08A.
W72-11509

ARKANSAS-RED RIVER BASINS WATER QUALITY CONTROL STUDY--PART I, AREAS VII, VIII AND X, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 05G.
W72-11510

KANAWHA RIVER COMPREHENSIVE BASIN STUDY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Kanawha River Basin Coordinating Committee, Huntington, W. Va.
For primary bibliographic entry see Field 04A.
W72-11511

BUFFALO HARBOR, NEW YORK--MAINTENANCE (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Buffalo, N.Y.
For primary bibliographic entry see Field 04A.
W72-11512

PEARL RIVER, MISSISSIPPI AND LOUISIANA--NAVIGATION (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08A.
W72-11513

GRAHAM BURKE PUMPING PLANT, ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08C.
W72-11514

PITTSBURGH COAL CO. V. SANITARY WATER BOARD (MINEOWNER'S DUTY TO TREAT WATERS DISCHARGED INTO WATERCOURSES).

286 A.2d 459-470 (Commw. Ct. Pa. 1972).

Descriptors: *Pennsylvania, *Subsurface drainage, *Mine water, *Permits, *Mine drainage, Water pollution, Rivers, Groundwater, Subsurface waters, Legislation, Mine acids, Mine wastes, Mining, Administration, Regulation, Legal aspects, Judicial decisions, Administrative agencies, Diversion, Water pollution sources, Water quality, Waste treatment, Water pollution treatment, Waste water treatment.

Appellant corporation sought reversal of an order of the Sanitary Water Board denying appellant a mine drainage permit for its coal mine. Abandoned mines adjacent to appellant's mine contained an underground lake of 100 to 350 billion gallons of polluted water. In order to mine coal from its own site appellant was forced to pump out water originating in the abandoned mines. Appellant contended that it was not required to treat discharge originating in the adjacent mine. The Clean Streams Act prohibits mine discharges until issuance of a permit. The court held that waters already formed in the abandoned mine constituted 'waters of the Commonwealth' and that the Board could not require the mine operator to treat such waters. The accumulated ground water in the abandoned mine when diverted into another water course naturally flowing into appellant's mine was not discharge from the mine within the meaning of the Clean Streams Act. In ordering the Board to issue a permit the court stated that to require appellant to treat waters originating in abandoned mines would be oppressive. (Ilkson-Florida)
W72-11516

U.S. GIVES VIEWS ON CONVENING CONFERENCE ON LAW OF THE SEA,
Department of State, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11521

ADVANCES IN ECOLOGICAL RESEARCH, VOL. 7.

Academic Press: London, England; New York, N.Y., 1971. 254p. Pr. $11.50.
Identifiers: *Ecology, *Fish, Microorganisms, *Aquatic plants, *Reviews, *Toxicity, Water pollution effects, *Environmental effects, Heavy metals.

The 4 reviews in this volume cover very diverse aspects of environmental biology as it relates to developments in ecology. The first review of the tolerance to heavy metals of certain plants presents information on the ability of plants and microorganisms to combat such toxic effects in both natural and man-made plant communities. In the second contribution, concerning the rate of net photosynthesis in plants, differences are cited in photosynthetic production capacity in different groups of plants and the ecological implications of such differences are discussed. The third contribution, involving the ecological aspects of fishery research, includes the application of fishery research, models of the dynamics of fish populations, factors affecting total abundance, and interaction between species. The fourth contribution concerns the effects of climatic trends on vegetational distribution, tree growth, and crop success over the last 2000 yr including physical, geophysical, glaciological and botanical data for both hemispheres. Extensive tables, graphs and bibliographic references are found throughout the four contributions. An author index is provided along with a subject index.--Copyright 1972, Biological Abstracts, Inc.
W72-11524

PENN'S LANDING, DELAWARE RIVER, PENNSYLVANIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 08D.
W72-11526

THE NATIONAL WATER COMMISSION ANNUAL REPORT FOR 1971.
National Water Commission, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11527

BUFFALO CREEK AT MEADOW GROVE, NEBRASKA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Neb.
For primary bibliographic entry see Field 04A.
W72-11529

WILLAPA RIVER AND HARBOR NAVIGATION PROJECT, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 04A.
W72-11530

WILLOW ISLAND LOCKS AND DAM, OHIO RIVER, OHIO AND WEST VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 08A.
W72-11531

SMALL NAVIGATION PROJECT, ANDREWS RIVER, HARWICH, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Waltham, Mass., New England Division.
For primary bibliographic entry see Field 08A.
W72-11532

LONG LAKE AREA, HELENA, ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08A.
W72-11533

DAVIDS CREEK LAKE, EXIRA, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Neb.
For primary bibliographic entry see Field 08A.
W72-11534

AN APPLICATION FOR MAJOR LICENSE FILED BY APPALACHIAN POWER COMPANY FOR CONSTRUCTED BYLLESBY AND BUCK HYDROELECTRIC PROJECT NO. 2514-VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 08A.
W72-11535

LITTLE CEDAR CREEK, COOSA RIVER BASIN, GEORGIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W72-11537

POINT LOOKOUT STATE PARK, ST. MARY'S COUNTY, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W72-11538

LONGBOAT PASS, MANATEE COUNTY, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W72-11539

BOXELDER CREEK WATERSHED, COLORADO AND WYOMING (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. Watershed Planning Div.
For primary bibliographic entry see Field 08A.
W72-11540

LEVEE PROTECTION AND STREAM IMPROVEMENTS, SUGAR CREEK, AT AND IN THE VICINITY OF BREWSTER, OHIO (DRAFT ENVIROMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 08A.
W72-11541

ST. FRANCIS BASIN, MISSOURI AND ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08A.
W72-11542

TRANTERS CREEK, BEAUFORT, MARTIN AND PITT COUNTIES, NORTH CAROLINA FLOOD CONTROL (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 04A.
W72-11543

COPAN LAKE, LITTLE CANEY RIVER, OKLAHOMA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 08A.
W72-11544

MILLS RIVER DAM AND RESERVOIR (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Office of Health and Environmental Science, Chattanooga.
For primary bibliographic entry see Field 08A.
W72-11545

JACKSONVILLE HARBOR, FLORIDA (SECTION 2) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W72-11546

SMALL BOAT HARBOR, PORTSMOUTH STATE PARK, OHIO, OHIO RIVER (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 08A.
W72-11547

KAUNAKAKAI HARBOR MAINTENANCE DREDGING, MOLOKAI, HAWAII (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 04A.
W72-11548

LEWIS AND CLARK CONNECTING CHANNEL, OREGON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08A.
W72-11549

THE DUCK RIVER PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Office of Health and Environmental Science, Chattanooga.
For primary bibliographic entry see Field 08A.
W72-11550

CHANNEL SNAGGING AND CLEARING PAINT CREEK, SOUTH OF CHILLICOTHE, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 04A.
W72-11554

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 05D.
W72-11555

CHESAPEAKE BAY HYDRAULIC MODEL, MATAPEAKE, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08B.
W72-11557

GREELEY, COLORADO--EPA PROJECT NO. COLO-261 (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W72-11558

DEEP GEOTHERMAL TEST WELL, GEOTHERMAL RESOURCE INVESTIGATIONS, IMPERIAL VALLEY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3 Office.
For primary bibliographic entry see Field 04B.
W72-11559

PROPOSED CONCRETE LINING OF MAIN OUTLET DRAIN, SOUTH GILA VALLEY, COLORADO RIVER FRONT AND LEVEE SYSTEM, ARIZONA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nevada. Region 3 Office.
For primary bibliographic entry see Field 08A.
W72-11560

TRANSACTIONS OF THE 36TH NORTH AMERICAN WILDLIFE AND NATURAL RESOURCES CONFERENCE.

Wildlife Management Institute: Washington. D. C., 1971. 534 p. Pr. $6.50.
Identifiers: Conference, *Fish, Forests, *Natural resources, Symposium, Transactions, *Wildlife.

This book presents the Transactions of the 36th North American Wildlife and Natural Resources Conference, the theme of which was resource use and quality living. The conference, held in Portland, Oregon, March 7-10, 1971, was divided into 3 major parts: society's failure to solve environmental problems; technical sessions on controlling land use: chemical contamination, oil, fish and wildlife, oil developments in Alaska-a panel, field and forest, and conservation communications; and a closing general session entitled national well-being demands solutions. A total of 45 contributions were presented, including a summarization and critique of the conference. The book is concluded with closing remarks and a list of the registered attendance.--Copyright 1972, Biological Abstracts, Inc.
W72-11681

07. RESOURCES DATA

7A. Network Design

CATALOG OF INTERNATIONAL HYDROLOGICAL DECADE STATIONS AND NETWORKS IN THE UNITED STATES.
National Committee for the International Hydrological Decade, Washington, D. C.

National Academy of Sciences--National Research Council Publication, Washington, DC, 1972. 66 p, 3 fig, 11 tab, 20 ref.

Descriptors: *International Hydrological Decade, *Basic data collections, *Hydrologic data, *Networks, *United States, Sites, Hydrology, Hydrologic cycle, Water resources development, Surface waters, Groundwater, Water yield, Water quality, Water supply, Documentation.
Identifiers: Station listing, Station types.

The International Hydrological Decade is a cooperative international program involving the efforts of over 100 nations. Its purposes are to strengthen the scientific basis for water use and conservation, to stimulate education and training in hydrology, and to improve the ability of developing and developed countries alike to cope with their water problems. In this catalog, the Decade Stations in the United States are discussed briefly by type and are described in tables and located on maps. Locations are also given in the tables wherever possible. The number of stations for various types of data collections includes 40 pan evaporation, 12 lysimeter, 82 river, 23 lake, 34 groundwater, 94 water quality, 60 representative and experimental (basins), 48 hydrological bench mark, 5 glacier, and 58 vigil. (Woodard-USGS)
W72-11280

SUMMARY OF PLANS FOR ACQUISITION OF SURFACE-WATER DATA BY FEDERAL AGENCIES, FISCAL YEAR 1973: STAGE, STREAMFLOW AND QUALITY.
Geological Survey, Washington, D.C. Office of Water Data Coordination.

Geological Survey Office of Water Data Coordination Report, 1972. 81 p, 2 fig, 7 tab, 3 append.

Descriptors: *Basic data collections, *Surface waters, *Streamflow, *Water quality, *United States, Federal government, Documentation, Reviews, Projections, Hydrologic data, Gaging stations, Sampling, Networks, Network design, Flow measurement, Chemical analysis, Rivers, Lakes, Reservoirs.

Long-term stations (three years of longer) operated by Federal agencies at which surface-water stage or streamflow were being measured as of January 1, 1971, are tabulated by Water Resources Regions. Agency plans for activation or discontinuance of stations during the period January 1, 1971, to June 30, 1973, are shown by agency. The plans call for the discontinuance of 501 stations and the activation of 289 stations; thus, the number of stations in operation as of June 1973 would decrease from 21,419 to 21,207. The same information is tabulated for long-term, surface-water quality stations operated by Federal agencies. Agency plans call for the activation of 327 stations and the discontinuance of 117 between January 1971 and June 1973. The number of surface-water quality stations anticipated as of June 1973 would increase from 5,928 to 6,138. Plans for activation or discontinuance of stations reported by the agencies are proposals for action and are subject to change. They represent the best estimates the agencies could make at the time of the field-coordination activity (Spring 1971). (Woodard-USGS)
W72-11287

7B. Data Acquisition

INFRARED TEMPERATURE SENSING OF SNOW-COVERED TERRAIN,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 02C.
W72-11129

FLUID CONTAMINATION MEASURING SYSTEM,
Alpha Advanced Systems, Inc., Inglewood, Calif. (assignee).
For primary bibliographic entry see Field 05A.
W72-11139

UNDERWAY WATER SAMPLER,
Department of the Navy, Washington, D.C.
R. L. Stewart, K. M. Olson, Jr., and L. Walsh.
U. S. Patent No 3,537,316, 3 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office Vol 880, No 1, p 62, November 3, 1970.

Descriptors: *Patents, *Sampling, *Water sampling, Instrumentation.

The water sampler has a chamber with a valve closure system which can be selectively triggered to capture a sample of liquid while the sampler is being towed from a ship. Electronic pressure and temperature sensors supply information to an X - Y plot. (Sinha-OEIS)
W72-11149

AUTOMATIC DETECTION OF WATER-BORNE FLUORESCENT TRACERS,
Colorado State Univ., Fort Collins.
H. Steppuhn, J. R. Meiman, and B. C. Goodell.
International Association of Scientific Hydrology Bulletin, Vol 16, No 4, p 83-89, December 1971. 4 fig, 18 ref.

Descriptors: *Tracers, *Fluorescent dye, *Monitoring, *Instrumentation, Tracking techniques, Sampling, Automation, Data collections, Measurement.
Identifiers: *Fluorescent tracers.

Water-borne fluorescent tracers are conventionally detected fluorometrically in liquid samples taken from the water body under test. A continuous, automatic, film system was developed to detect tracer concentrations of one part per billion, provide a time distribution of concentration changes, and combine low cost with ready portability. Field installations are self-operative for up to 10 days. A single laboratory-based fluorometer can easily analyze the concurrent data input from 15 or more field installations. Data can also be stored prior to fluorometry. Fluorescent tracers have been detected successfully by the film system under experimental conditions to gage streamflow, to produce flow hydrographs, and to determine the travel time of streamflow. Further refinements can be made by potential users to optimize the system for specific needs. (Knapp-USGS)
W72-11297

A FURTHER CONTRIBUTION TO USING ULTRASONIC SENSORS FOR FISH ACTIVITY STUDIES,
California Univ; La Jolla. School of Medicine.
J. E. Byrne.
Trans Am Fish Soc. Vol 100 No 4 p 792-794. 1971. Illus.
Identifiers: *Fish behavior, Oncorhynchus nerka, Salmon, *Sensors, Ultrasonics, Equipment.

The application of a technique (Muir et al, 1965) using ultrasonic sensors to a study of spontaneous locomotor activity cycles in juvenile sockeye salmon (Oncoryhynchus nerka) is given.--Copyright 1972, Biological Abstracts, Inc.
W72-11324

USE OF ULTRASONIC TESTING IN WATER FACILITY CONSTRUCTION, OPERATION, AND MAINTENANCE,
Bureau of Reclamation, Denver, Colo.
T. E. Backstrom.
Paper, American Society of Civil Engineers National Water Resources Engineering Meeting, Atlanta, Ga., Jan 1972. 16 p, 5 fig, 6 ref.

Descriptors: *Ultrasonics, *Nondestructive tests, *Materials tests, Sound waves, Detection, Sensors, Foundation investigations, Reservoir leakage, Vibrations, Operation and maintenance, Quality control.
Identifiers: *Ultrasonic tests, *High frequency monitoring, Pulse echo technique, Sonic velocity tests, Thickness measurement.

Recent advances in materials applications have given impetus to rapid development of advanced nondestructive testing techniques. Ultrasonic testing, one of the most useful forms of nondestructive testing is commonly used to determine the presence of flaws in materials and welds; to measure properties, dimensions, and conditions; to sense changes in materials resulting from corrosion or mechanical damage; and to monitor changes in structures and operating machinery indicative of approaching failure. New applications and instruments are being developed at a rapid rate. Sonic devices, their operating principles, and application to testing and monitoring use in construction, operation, and maintenance of water facilities are discussed. (USBR)
W72-11364

FIELD MEASUREMENTS WITH COMMON EQUIPMENT,
Sacramento State Coll., Calif.
N. C. Janke.
Photogrammetric Engineering, Vol. 38, No. 1, p 37-47, Jan 1972. 2 fig, 1 tab, 2 ref.

Descriptors: *Mapping, *Geologic mapping, *Measurement, On-site investigations, Photography, Cameras, Graphical analysis, Terrian analysis, Geologic investigations, Geology, On-site data collections.
Identifiers: *Photointerpretation, Dipping, Foliation, Photogeology, *Photographic analysis.

Mapping and measurement with an ordinary camera have been largely ignored by geologists and others who might benefit from such use. Simple operations with a few tripod accessories will yield mapping and measurement of outcrop features to precisions of about 0.1 deg or better, and 0.5% in linear measurement. The result obtainable include the fixing of map positions and elevations, determination of apparent angles (e.g., dips, lineations, foliations) and true angles, measurement of fault separations, size distributions of coarse materials, and metrics of fossil impressions. The basic field measurements are: (1) length of a level line indicated on the outcrop face by 2 stakes or other markers; (2) angle of the dip of the outcrop face; (3) one photo from a level camera; (4) the distance setting on the focal ring of the camera; (5) correctly exposed and focused photographs; and (6) vertical rods or stakes of known height. The necessary field equipment includes: (1) a camera (a 35-mm single-lens reflex), and (2) a tripod with an attachment for leveling the panning plane. (USBR)
W72-11371

DRAINAGE TILE LOCATION USING AERIAL PHOTOGRAPHY,
Army Topographic Command, Washington, D.C.; and Ohio State Univ., Columbus.
For primary bibliographic entry see Field 04A.
W72-11374

ORTHOPHOTOGRAPHY IN THE EVALUATION OF MAN'S ENVIRONMENT,
Baker (Michael J.), Inc. Rochester, Pa. Photogrammetric Engineering Div.
C. E. McNoldy.
Preprint of paper presented at American Society of Civil Engineers National Meeting on Water Resources Engineering, Atlanta, Georgia, January 24-28, 1972. 14 p, 4 fig, 5 ref.

Descriptors: *Photography, *Remote sensing, *Aerial photography, *Mapping, *Water resources development, Instrumentation, Terrain analysis, Topography, Geology, Planning, Environmental control, Evaluation.
Identifiers: *Orthophotography.

Orthophotography is a recently developed photogrammetric technique which enables the photogrammetrist to achieve a scale-rectified image of a portion of the earth's surface on a photographic emulsion. The orthophotograph is produced by an instrument which removes the effects of tilt, relief and many of the lens aberrations from the aerial photographs taken of the terrain. Consequently, each incremental area of the photograph is relocated to where it would have appeared had the photograph been taken from infinity. The detail depicted on the orthophoto depends upon the scale and resolution of the original aerial photographs as well as the fidelity of reproduction of the orthorectification technique. On large scale orthophotos in the order of 1:1000, surface detail such as water hydrants, lamp posts, utility poles and guard rail posts can be recognized. Numerous applications exist for rapidly produced and correctly rectified orthophotographs. For example, geologists apply orthophoto techniques to structural studies, investigations of water resources, engineering geology investigations, and general geologic mapping. (Woodard-USGS)
W72-11659

VOLUMETRIC COMPONENT ANALYSIS OF UNCONSOLIDATED SEDIMENTS USING SLIT SIEVES,
Bristol Univ. (England). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W72-11664

THE MEASUREMENT OF CONDUCTIVITY AND TEMPERATURE IN THE SEA FOR SALINITY DETERMINATION,
Department of the Environment, Victoria (British Columbia). Frozen Sea Research Group.
E. L. Lewis, and R. B. Sudar.
Aidjex Bulletin No 13 (Washington University, Seattle), p 93-113, May 1972. 4 fig, 2 tab, 11 ref.

Descriptors: *Salinity, *Oceans, *Estuaries, *Cold regions, Measurements, Specific conductivity, Water temperature, Depth, Ice-water interfaces, Saline water intrusion, Forecasting, Analytical techniques, Equations.
Identifiers: Salinity calculations, Salinometer.

Problems of obtaining in situ measurements of electrical conductivity and temperature in the sea at known levels of accuracy are outlined. Practical solutions are offered with emphasis on calibration procedures. Conversion of the resulting values at temperatures below 10 deg C is discussed. The equipment and techniques for the measurements are of particular interest to studies in Arctic oceanography but should be relevant to oceanographic measurements in any part of the world. (Woodard-USGS)
W72-11669

THE MEASUREMENT OF SNOW DEPTH AND DENSITY USING A SHORT PULSE RADAR SYSTEM,
Colorado State Univ., Fort Collins. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 02C.
W72-11671

SIMULTANEOUS DETERMINATION OF SAMPLE CONCENTRATION AND REAGENT BLANK,
Hach Chemical Co., Ames, Iowa. Water Analysis Research Lab.
For primary bibliographic entry see Field 05A.
W72-11703

DIRECT STEADY STATE CALIBRATION OF A FLAME IONIZATION DETECTOR,
Rice Univ., Houston, Tex. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05A.
W72-11706

STANDARD SOLUTION FOR REDOX POTENTIAL MEASUREMENTS,
Foxboro Co., Mass. Research Center.
For primary bibliographic entry see Field 02K.
W72-11707

INTERNATIONAL AFLATOXIN CHECK SAMPLE PROGRAM: 1971 STUDY,
WARF Inst., Inc., Madison, Wis.
For primary bibliographic entry see Field 05A.
W72-11709

USE OF CONTINUOUS RECORDING SALINITY-TEMPERATURE-PRESSURE INSTRUMENTATION AT OCEAN STATION P (50N, 145W),
Fisheries Research Board of Canada, Nanaimo (British Columbia). Pacific Oceanographic Group.
C. A. Collins, and D. A. Healey.
Journal Fisheries Research Board of Canada, Vol 29, No 3, p 323-327, March 1972. 3 fig, 2 tab, 9 ref.

Descriptors: *Monitoring, *Salinity, *Temperature, *Pressure, *Electronic equipment, Evaluation, Data collections, Data processing, Computers, Instrumentation, Oceans, Measurement, Automation, On-site investigations, Equipment.
Identifiers: Nansen bottles, Precision, Performance evaluation.

An evaluation has been made of the precision of Salinity-Temperature-Pressure (STP) instruments at ocean station P, as well as a comparison of this method to the Nansen bottle technique of water analysis. Data collected by both instruments on scientific ocean cruises were electronically processed to determine precisions and standard deviations. The operational precision of STP instruments for salinity and temperature was estimated as 0.07 ppt and 0.07 C, respectively. Correction of electronically digitized data for instrument response constants failed to improve the quality of the data. However, a response constant of 1 sec would remove the salinity inversions associated with large temperature gradients. Smoothing of STP data with a numerical taper about 2-db wide and decimation to 2-db intervals seemed appropriate for 0.2 sec sampling rates. (Mackan-Battelle)
W72-11722

THE CONTRIBUTION OF GAS CHROMATOGRAPHY TO THE IDENTIFICATION OF SUBSTANCES,
Akademiya Nauk SSSR, Moscow. Institut Fizicheskoi Khimii.
For primary bibliographic entry see Field 02K.
W72-11725

REPORT ON HAZARDOUS SUBSTANCES,
Food and Drug Administration, Washington, D.C. Office of Product Safety.
D. F. McCaulley.
Journal of the Association of Official Analytical Chemists, Vol 55, No 2, p 242-243, March 1972. 1 tab, 3 ref.

Descriptors: *Chemical analysis, *Quality control, Evaluation, Testing, Viscosity, *Methodology, Inspection, Performance, Standards, Physical properties, *Laboratory tests, *Pollutant identification.
Identifiers: Interlaboratory studies, Performance evaluation, Flash point, Petroleum distillates, Petroleum residues, Hazardous substances, Errors.

An interlaboratory study was conducted by the Food and Drug Administration's Field Scientific Coordinating Staff in order to ascertain the quality of testing methodology. Eighteen FDA laboratories were each given 2 quart cans of liquid 'all purpose' thinner in order to classify it under the Hazardous Substances Act. The cans were all of the same lot and all samples were identical. Three tests were performed according to prescribed methods: (1) petroleum distillates (as unsulfonated residues), (2) flash point, and (3) viscosity. No difficulties were encountered with the methodology in general; however, two laboratories were outside the allowed range of 2 standard deviations for one or more of the methods. Examination revealed improper standardization or difficulties in laboratory technique technique as the cause of these poor results. Only one of these methods is included in Offical Methods of Analysis, although all have been validated by either AOAC or ASTM. Thus, these and several other validated methods will be proposed as additions to the hazardous substances chapter in Official Methods of Analysis. (Mackan-Battelle)
W72-11728

INSTRUMENTATION FOR MEASUREMENT OF WASTEWATER FLOW,
IIT Research Inst., Chicago, Ill.
For primary bibliographic entry see Field 05B.
W72-11732

A NEW MOUNTING MEDIUM FOR DIATOMS,
Bemidji State Coll., Minn. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W72-11738

7C. Evaluation, Processing and Publication

CONJUNCTIVE USE OF WATER IN WEST TEXAS-BENEFITS TO NONCOOPERATORS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 04B.
W72-11116

PHYSICAL INVESTIGATIONS OF THE SEASONAL MOUNTAIN SNOWPACK: BRIDGER RANGE, MONTANA,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 02C.
W72-11130

FLOODS ON THE GUYANDOTTE RIVER IN THE VICINITY OF LOGAN, LOGAN COUNTY, WEST VIRGINIA,
Geological Survey, Washington, D.C.
E. A. Friel, and G. S. Runner.
Available from USGS, Washington, DC 20242 Price $1.50. Geological Survey Hydrologic Investigations Atlas HA-347, 2 sheets, 1972. 10 fig, 2 maps, 3 ref.

Descriptors: *Floods, *Flood plains, *Flood control, *Hydrologic data, *West Virginia, Aerial photography, Photogrammetry, Maps, Appalachian Mountain Region, Flood profiles, Flood forecasting, Flood recurrence interval.
Identifiers: *Logan County (W. VA.), *Guyandotte River.

This 2-sheet atlas was prepared by the U.S. Geological Survey to further the objectives of the Appalachian Regional Commission. Hydrologic data are presented concerning the extent, depth, and frequency of flooding along the Guyandotte River in the vicinity of Logan, Logan County, West Virginia. The data will aid those individuals, organizations, and government agencies who are responsible for making decisions for the safe and economical use of these flood-plain lands. The approximate boundaries of inundation along the Guyandotte River by hypothetical floods having recurrence intervals of 5, 25, and 50 years are delineated on an aerial photomosaic map. Depths of inundation and limits of overflow of floods of various magnitudes can be estimated by using the methods and relations presented. (Woodard-USGS)
W72-11278

ANALOG SIMULATION OF WATER-LEVEL DECLINES IN THE SPARTA SAND, MISSISSIPPI EMBAYMENT,
Geological Survey, Washington, D.C.
J. E. Reed.
Available from USGS, Washington, DC 20242, Price $0.75. Geological Survey Hydrologic Investigations Atlas HA-434, 1 sheet, 1972. 5 fig, 1 tab, 3 ref.

Descriptors: *Groundwater, *Water level fluctuations, *Drawdown, *Analog models, *Mississippi River basin, Water wells, Water supply, Withdrawal, Pumping, Water levels, Forecasting, Projections, Hydrologic data, Aquifer characteristics, Maps, Groundwater resources, Transmissivity, Storage coefficient.
Identifiers: *Mississippi Embayment, Sparta Sand.

Because local groundwater withdrawals from several aquifers in the Mississippi embayment have caused water-level declines that are of regional and interstate significance, an analog model of the Sparta Sand was used to predict and evaluate the regional effects of increasing future water withdrawals. The results are presented on a one-sheet hydrologic atlas. The transmissivity of the analog model, determined from data in files of the U.S. Geological Survey, ranged from 7,000 to 70,000 sq ft per day. The storage coefficient used was assumed to be proportional to the thickness of the aquifer and ranged from 0.0001 to 0.001. Although the model was constructed with a coarse grid spacing and data in some areas were scarce, it nevertheless gives reasonable regional values for water levels that may be expected as a result of projected pumping rates and proposed future withdrawals. The model can be useful in theconstruction of more detailed models of local problem areas within the Mississippi embayment, and also in the management of water resources of the entire region. (Woodard-USGS)
W72-11279

METEOROLOGICAL DATA, 1950-1970,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
D. S. Rickard.

Descriptors: *Meteorological data, *Data collections, *Weather data, *Synoptic analysis, Foreign countries, Rainfall, Humidity, Air temperature, Winds, Soil temperature, Grasses, Instrumentation.
Identifiers: *New Zealand, Winchmore Irrigation Research Station (N.Zealand).

Twenty-one years of meteorological data from the Winchmore Irrigation Research Station in New Zealand are summarized. Data extremes for the period of record are: maximum air temperature 35.9C, Jan. 19, 1956; minimum air temperature -8.4 C, May 25, 1952; minimum grass temperature -11.0 C, Aug. 1, 1957; greatest annual rainfall 948.5 mm, 1957; least annual rainfall 491.3 mm, 1969; greatest monthly rainfall 253.0 mm, Nov. 1952; least monthly rainfall 2.5 mm, June 1966; greatest daily rainfall 95.3 mm, Feb. 9, 1951; and greatest daily miles of wind 702, Feb. 2, 1952. (Woodard-USGS)
W72-11281

WATER RESOURCES DATA FOR KANSAS, 1971: PART I. SURFACE WATER RECORDS.
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 02E.
W72-11282

TEMPERATURE OF FLORIDA STREAMS,
Geological Survey, Tallahassee, Fla.
W. Anderson.
Florida Bureau of Geology Map Series No 43, 1 sheet, 1971. Text, 5 fig, 1 map, 1 tab, 1 ref.

Descriptors: *Water temperature, *Streams, *Surface waters, *Florida, Air temperature, Data collections, Canals, Average, Variability, Fluctuations, Frequency curves, Measurement, Sites, Maps.

The highest and lowest stream temperatures observed in Florida since 1956 were 100 F for Fisheating Creek near Venus and 34 F for Ochlockonee River near Havana. The Sopchoppy River in northern Florida and Miami Canal in southern Florida show how water temperatures vary with time, location and air temperature. The range in observed temperatures of these streams, 40 F to 98 F, encompasses the range in temperature likely to occur elsewhere in the State. Illustrations in this map report indicate the effect of geographic location on the seasonal variation in stream temperatures and variations in air temperatures and stream temperatures in northern and southern Florida. The percentage of days that the diurnal range in water temperature of Sopchoppy River and Taylor Slough equals or exceeds a specific number of degrees and the percentage of days that temperatures are likely to be equalled or exceeded in northern and southern Florida are also shown. (Woodard-USGS)
W72-11284

RECORDS OF PRECIPITATION, WATER LEVELS, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1971.
Geological Survey, San Antonio, Tex.

Edwards Underground Water District Bulletin 30, May 1972. 11 p, 4 tab, 12 ref.

Descriptors: *Groundwater, *Water levels, *Hydrologic data, *Basic data collections, *Texas, Precipitation (Atmospheric), Groundwater recharge, Aquifers, Streamflow, Flow rates, Hydrogeology, Limestones.
Identifiers: *San Antonio area (Tex), Edwards Limestone.

Records of precipitation, water levels, and estimates of recharge to the Edwards and associated limestones in the San Antonio, Texas, area during 1971 are summarized. Data tabulations are from 8 precipitation sites, 25 streamflow gaging stations, and 5 wells. Rainfall was above average

throughout most of the recharge area. Water levels reached a lower point during June than had been experienced for several years; however, toward the latter part of the year, water levels were near the record highs. Recharge to the Edwards and associated limestones is chiefly from streams that lose most of their base flow and part of their flood flow as they cross the Balcones Fault Zone on the outcrop of the aquifer. Total recharge in 1971 was in excess of the average annual recharge by nearly 400,000 acre-feet and was about 75% above the annual average. (Woodard-USGS)
W72-11288

CONTROL OF THE DAILY WATER LEVEL DATA--TEST BY RELATING REDUCED LEVELS (CONTROLE DES COTES HYDROMETRIQUES JOURNALIERES--TEST DU RAPPORT DES COTES REDUITES),
Institut Royal Meteorologique de Belgique (Brussels). Hydrology Section.
For primary bibliographic entry see Field 02A.
W72-11296

WATER RESOURCES INVESTIGATIONS IN PENNSYLVANIA, 1969.
Geological Survey, Washington, D.C.

Geological Survey Report of Investigations Folder, 1 sheet, 1969. 6 fig, 1 map.

Descriptors: *Water resources, *Investigations, *Pennsylvania, *Inter-agency cooperation, Surface waters, Groundwater, Surveys, Planning, Hydrologic data, Basic data collections, Precipitation (Atmospheric), Streamflow, Runoff, Water temperatures, Sediment transport, On-site investigations, Water quality, Dissolved solids, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U. S. Geological Survey in Pennsylvania are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 251 primary, secondary, and water management streamflow stations; 66 groundwater observation wells; and 88 water quality observing sites. Small State maps show principal sources of groundwater, average annual precipitation, average annual runoff, discharge of the principal rivers, and zones of similar surface-water chemistry. A map, scale 28 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in Pennsylvania in January 1969. (Woodard-USGS)
W72-11305

WATER RESOURCES INVESTIGATIONS IN MAINE, 1968.
Geological Survey, Washington, D.C.

Geological Survey Report of Investigations Folder, 1 sheet, 1968. 4 fig, 1 tab.

Descriptors: *Water resources, *Investigations, *Maine, *Inter-agency cooperation, Precipitation (Atmospheric), Runoff, Surveys, Planning, Hydrologic data, Basic data collections, Streamflow, Sediment transport, On-site investigations, Water temperature, Water quality, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U. S. Geological Survey in Maine are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 57 primary, secondary, and water management streamflow stations; 13 groundwater observation wells; and 7 water quality observing sites. Small State maps show areas of published groundwater reports, mean annual precipitation, average annual runoff, and discharge of principal rivers. A map, scale approximately 40 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in Maine in July 1968. (Woodard-USGS)
W72-11306

WATER RESOURCES INVESTIGATIONS IN TENNESSEE, 1968.
Geological Survey, Washington, D.C.

Geological Survey Report of Investigations Folder, 1 sheet, 1969. 7 fig, 1 map.

Descriptors: *Water resources, *Investigations, *Tennessee, *Inter-agency cooperation, Surveys, Planning, Hydrologic data, Basic data collections, Precipitation (Atmospheric), Runoff, Streamflow, Sediment transport, On-site investigations, Water temperature, Springs, Water quality, Dissolved solids, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U. S. Geological Survey in Tennessee are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 122 primary, secondary, and water management streamflow stations; 3 springflow stations; 65 groundwater observation wells; and 121 water quality observing sites. Small State maps show principal sources of groundwater, average annual precipitation, average annual runoff, suspended sediment concentrations of streams, discharge of the principal rivers, and the dissolved solids in streams. A map, scale 24 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in Tennessee in December 1968. (Woodard-USGS)
W72-11307

A COMPUTER MODEL OF THE TIDAL PHENOMENA IN COOK INLET, ALASKA,
Alaska Univ., Fairbanks, Inst. of Water Resources.
For primary bibliographic entry see Field 02L.
W72-11355

ON THE SIGNIFICANCE OF THE HOERNER WALDORF WELL FIELD WATER-TABLE FLUCTUATIONS,
Montana Univ., Missoula. Water Resources Research Center.
For primary bibliographic entry see Field 04B.
W72-11383

LAND DRAINAGE SURVEY: III. MAPS OF IRELAND SHOWING THE GENERAL DISTRIBUTION OF DRAINAGE PROBLEMS AND OF DRAINAGE SCHEMES,
Foras Taluntais, Dublin (Ireland).
For primary bibliographic entry see Field 04A.
W72-11419

GLACIER DAMMED LAKES AND OUTBURST FLOODS IN ALASKA,
Geological Survey, Washington, D.C.
A. Post, and L. R. Mayo.
Available from USGS, Washington, DC 20242, Price - $1.50. Geological Survey Hydrologic Investigations Atlas HA-455, 3 sheets, 1971. Text, 3 fig, 2 map, 1 tab, 12 photo, 71 ref.

Descriptors: *Glaciology, *Lakes, *Floods, *Melt water, *Alaska, Ice, Dams, Glaciers, Arctic, Flood damage, Data collections, Aerial photography, Aircraft, Volcanoes, Temperature, Flood forecasting, Flood plains, Streamflow.
Identifiers: *Atlas.

Glacier dammed lakes in south-central and southeastern Alaska and in adjacent Canada which drain into rivers entering Alaska are numerous; 750 glacier dammed lakes are plotted on the maps of this 3-sheet hydrologic atlas. The number and size of individual lakes vary enormously during the seasons and from year to year. An assessment is presented of the hazardous glacier outburst floods in Alaska by mapping the present extent of glaciers, the location of glacier dammed lakes and glacier-clad volcanoes, presenting the recent history of several prominent glacier dammed lakes, and delineating areas where outburst flooding may be expected. Recommendations are made for monitoring a few lakes which cause very large or potentially damaging floods. Base maps showing the glaciers were compiled from United States and Canadian topographic maps, scale 1:250,000 reduced to 1:1,000,000. These were extensively revised and brought up to date by checking more than 15,000 aerial photographs of glaciers taken between 1960 and 1970. (Woodard-USGS)
W72-11445

WATER MEASUREMENTS OF COASTAL LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans. Div. of Oysters, Water Bottoms and Seafoods.
For primary bibliographic entry see Field 02L.
W72-11446

DRILLERS' LOGS OF WELLS IN HARRIS COUNTY, TEXAS, 1905-71,
Geological Survey, Austin, Tex.
R. K. Gabrysch, G. D. McAdoo, and C. W. Bonnet.
Geological Survey Open-file Report (Texas District), 1972. 420 p, 1 fig, 5 ref.

Descriptors: *Water wells, *Drillers logs, *Geologic units, *Texas, *Lithologic logs, Depth, Well data, Maps, Sites, Data collections, Geologic formations, Profiles.
Identifiers: *Harris County (Tex).

Drillers' logs are presented for approximately 1,200 wells in Harris County, Texas, that were collected from 1905 to 1971 as part of the county's groundwater inventory. The logs include the thickness of each geologic unit along with the accumulated depth for the units from land surface to well bottom. A map of the county, scale 4 miles to the inch, shows locations of the wells. (Woodard-USGS)
W72-11449

ANALYSIS OF POTENTIAL ERRORS IN REAL--TIME STREAMFLOW DATA AND METHODS OF DATA VERIFICATION BY DIGITAL COMPUTER,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 02E.
W72-11460

GROUNDWATER IN LAKE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
D. D. Knochenmus.
Florida Bureau of Geology Map Series No 44, 1 sheet, 1971. 5 fig, 9 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water supply, *Florida, Hydrologic data, Data collections, Maps, Hydrographs, Geology, Groundwater recharge, Water yield, Water quality, Water utilization, Irrigation, Citrus fruits, Water level fluctuations.

Identifiers: *Lake County (Fla).

Maps, sections, and graphs show some of the important hydrogeologic features, the quality of water, and fluctuations of the potentiometric surface of the Floridan aquifer in Lake County, Florida. The major use of water is for irrigation. Of the 143,000 acres of citrus groves in 1970, 36,000 acres, or about 25%, was irrigated. Seventy-five percent was irrigated from the Floridan aquifer and 25% from lakes and streams. Water-level fluctuations in five wells open to the Floridan aquifer are shown by hydrographs. For the period shown, 1959-69, no overall decline of groundwater levels is indicated. Water in the Floridan aquifer is of good quality, except in the St. Johns River valley, where it contains dissolved solids that exceed the maximum of 500 mg/liter recommended for public supplies by the U.S. Public Health Service. (Woodard-USGS)
W72-11462

WATER RESOURCES INVESTIGATIONS IN NEVADA, 1968.
Geological Survey, Washington, D.C.

Geological Survey Report of Investigations Folder, 1 sheet, 1968. 5 fig, 1 map.

Descriptors: *Water resources, *Investigations, *Nevada, *Inter-agency cooperation, Precipitation (Atmospheric), Runoff, Surveys, Planning, Hydrologic data, Basic data collections, Streamflow, Water temperature, Sediment transport, On-site investigations, Water quality, Dissolved solids, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U.S. Geological Survey in Nevada, are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 97 primary, secondary, and water management streamflow stations; 242 groundwater observation wells; and 10 water quality observing sites. Small State maps show principal sources of groundwater, discharge of the principal rivers, average annual precipitation, average annual runoff, and areas where quantitative water reports have been completed. A map, scale 50 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in Nevada in September 1968. (Woodard-USGS)
W72-11653

WATER RESOURCES INVESTIGATIONS IN NEW HAMPSHIRE, 1968.
Geological Survey, Washington, D.C.

Geological Survey Report of Investigations Folder, 1 sheet, 1969. 3 fig, 1 map.

Descriptors: *Water resources, *Investigations, *New Hampshire, *Inter-agency cooperation, Runoff, Surveys, Planning, Hydrologic data, Basic data collections, Streamflow, Precipitation (Atmospheric), On-site investigations, Water quality, Water temperatures, Sediment transport, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U.S. Geological Survey in New Hampshire, are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 60 primary, secondary, and water management streamflow stations; 26 groundwater observation wells; and 10 water quality observing sites. Small State maps show discharge of the prinicpal rivers, mean annual precipitation, and average annual runoff. A map, scale 20 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in New Hampshire in December 1968. (Woodard-USGS)
W72-11654

ORTHOPHOTOGRAPHY IN THE EVALUATION OF MAN'S ENVIRONMENT,
Baker (Michael J.), Inc. Rochester, Pa. Photogrammetric Engineering Div.
For primary bibliographic entry see Field 07B.
W72-11659

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE AUSTIN, TEXAS METROPOLITAN AREA, 1970,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W72-11661

STORM RAINFALL VARIABILITY OVER CONNECTICUT,
The Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 02B.
W72-11668

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02H.
W72-11670

TECHNIQUES FOR ASSESSING WATER RESOURCE POTENTIALS IN THE DEVELOPING COUNTRIES WITH EMPHASIS ON STREAMFLOW, EROSION AND SEDIMENT TRANSPORT, WATER MOVEMENT IN UNSATURATED SOILS, GROUND WATER, AND REMOTE SENSING IN HY DROLOGIC APPLICATIONS,
Geological Survey, Washington, D.C.
G. C. Taylor, Jr.
Available from NTIS, Springfield, Va 22151 as PB-207 192, Price: $3.00 paper copy; 95 cents microfiche. Geological Survey Report prepared for Agency for International Development, December 1971. 70 p, 46 ref.

Descriptors: *Data collections, *Basic data collections, *Data processing, *Instrumentation, *Water resources development, Economics, Streamflow, Erosion, Sediment transport, Groundwater, Remote sensing, *Foreign countries, *Tropical regions.
Identifiers: Developing countries.

This preliminary report describes techniques for assessing water-resource potentials in the developing countries, most of which lie in the tropics. These techniques are well established in the developing countries. Institutional and economic constraints, however, inhibit growth of sustained programs of hydrologic data collection and application of the data to problems in engineering technology. Computer-based technology, including automatic processing of hydrologic data and mathematical modeling is also well begun in many developing countries and has much wider potential application. Application of nuclear techniques to hydrologic problems is likely to be marginal for some years. Remote sensing offers great promise for synoptic evaluations of water resources and hydrologic processes, including the transient phenomena of the hydrologic cycle. There are few identifiable gaps in existing hydrologic instrumentation and methodology. What is needed is acceleration of institutional development and professional motivation toward more effective use of existing and proven methodology. Moreover, much sophisticated methodology can be applied effectively in the developing countries only when adequate levels of indigenous scientific skills have been reached and supportive institutional frameworks are evolved. (Knapp-USGS)
W72-11672

WATER RESOURCES INVESTIGATIONS IN NORTH DAKOTA, 1969.
Geological Survey, Washington, D.C.

Geological Survey Report of Investigations Folder, 1 sheet, 1969. 7 fig, 1 map.

Descriptors: *Water resources, *Investigations, *North Dakota, *Inter-agency cooperation, Surveys, Planning, Hydrologic data, Basic data collections, Precipitation (Atmospheric), Runoff, Streamflow, Sediment transport, Water temperature, On-site investigations, Water quality, Dissolved solids, Water level fluctuations, Bibliographies, Networks, Maps.
Identifiers: *Cooperative water-studies program, Research projects.

The water resources studies and investigations of the U. S. Geological Survey in North Dakota are summarized. A selected bibliography of material concerning the State is included. A list is given of State and Federal agencies, counties, and cities who cooperate in different parts of the program. The hydrologic data network consists of 120 primary and water management streamflow stations; 124 groundwater observation wells; and 19 water quality observing sites. Small State maps show principal sources of groundwater, average annual precipitation, average annual runoff, discharge of the principal rivers, and the dissolved solids in surface waters. A map, scale 50 mi to the inch, shows by symbols, numbers, and colored outline the hydrologic data network and investigations in North Dakota in January 1969. (Woodard-USGS)
W72-11675

RANDOM-WALK MODEL OF STREAM NETWORK DEVELOPMENT,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 02J.
W72-11676

08. ENGINEERING WORKS

8A. Structures

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-200 342D, $3.00 in paper copy, $0.95 in microfiche. May 1971. 130 p, 1 map.

Descriptors: *Florida, *Environmental effects, *Water management (Applied), *Flood protection, *Water control, Flood control, Wildlife habitats, Land use, River basins, Canals, Levees, Navigation, Fish, Recreation, Water supply, Water demand, Water conveyance, Channel improvement, Aquatic plants, Water pollution, Water pollution sources, Water quality, Water quality control, Floods, Multiple purpose projects, Project benefits, Project purposes, Drainage, Water conservation, Navigable rivers, Lakes.
Identifiers: Lake Okeechobee (Fla), Kissimmee River (Fla), St. Johns River (Fla) *Environmental Inpact Statements.

The project consists of a system of canals, levees, pumping plants, control structures and channel improvements for flood control, drainage water conservation, and wildlife conservation, and to retard

or prevent salt water intrusion in coastal areas and provide water supplies for Central and South Florida. The project would convert aquatic swamplands into terrestrial environment and raise the water level of Lake Okeechobee. It would alter natural flowing streams in areas of the St. Johns and Kissimmee Rivers. Wildlife habitats and sport fishing in the Okeechobee River would be adversely affected. Conveyance of water may cause water quality problems due to excessive nutrients. An immediate short term effect of the project would be impaired water quality caused by construction. The long term effect however would be beneficial to water quality. The project would provide a more dependable source of water to the Everglades. Irreversible commitment of resources would be wildlife habitats, natural marshlands and 38 miles of natural rivers. Alternatives to each facet of the project are included. (Backins-Florida)
W72-11173

PROPOSED CHANGE IN THE OPERATION OF THE EXISTING KORTES UNIT OF THE PICK-SLOAN MISSOURI BASIN PROGRAM, WYOMING (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as PB-202 303D, $3.00 in paper copy, $0.95 in microfiche. August 1971. 15 p, 1 map.

Descriptors: *Missouri River, *Wyoming, *Environmental effects, *Hydroelectric plants, *Flow control, Reservoir releases, Flow duration, Flow rates, River flow, Fishing, Fish establishment, Stream fisheries, Recreation, Trout, Reservoirs, Reservoir fisheries, Reservoir operation, Dams, Project planning.
Identifiers: *Environmental impact statements.

The proposed project will involve changing the method of operating the Kortes unit dam of the Pick-Sloan Missouri Basin Program, Wyoming. The project is currently a single-purpose hydroelectric facility. The project will alter operations to provide a minimum flow of 500 cubic feet per second in the 10 mile reach of the North Platte River between Kortes dam and Pathfinder Reservoir in order to restore and enhance trout fishing. The project would have a favorable environmental impact by restoring much of the rivers former aesthetic quality and restoring the fishery. The supply of freshwater shrimp will also be increased. Adverse environmental effects include an annual power loss reduction which will require increased output from other power facilities. Additionally a greater concentration of refuse can be expected in the area from increased human use. Various alternative minimum flows were considered and their effects evaluated. The proposed change would not be irreversible and would not be made at a loss of any known long-term needs. (Grant-Florida)
W72-11176

OCONTO HARBOR, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.

Available from the National Technical Information Service as PB-201 329F, $3.00 in paper copy, $0.95 in microfiche. July 1971. 22 p, 1 map.

Descriptors: *Wisconsin, *Environmental effects, *Breakwaters, *Channel improvement, Dredging, Disposal, Spoil banks, Aquatic habitats, Aquatic environment, Harbors, Inland waterways, Rivers and Harbors Act, Turbidity, Recreation, Boating, Beaches, Shore protection, Maintenance.
Identifiers: *Environmental impact statements.

The project will involve rehabilitation of the badly deteriorated south breakwater at Oconto Harbor, Wisconsin. The project would replace the stone filled piling structure by a rubble-mound stone covered breakwater. The project also will involve dredging the existing channel to the authorized 15 foot level. Spoil will be placed as beach nourishment. Spoil will not be polluted and will be dumped in an undeveloped area. Destruction of plant life and turbidity from dredging will be temporary. Adverse impacts include disturbance of fish and plant life from dredging, disturbance of plant life in the disposal area, and loss of breakwater vegetation. Loss of plant material should not significantly affect the terrestrial ecology. Alternatives include dredging to a more shallow depth and steel and concrete breakwater construction. Alternate disposal sites are unsatisfactory. (Grant-Florida)
W72-11179

FORT SCOTT LAKE, MARMATON RIVER, KANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.

Available from the National Technical Information Service as PB-201 520D, $3.00 in paper copy, $0.95 in microfiche. June 1971. 8 p, 2 map.

Descriptors: *Kansas, *Environmental effects, *Flood control, *Dam construction, Dams, Flood protection, Lakes, Alternative planning, Comprehensive planning, Coordination, Multiple-purpose projects, Easements, Land development, Outlet works, Impoundments, Water quality control, Water supply development.
Identifiers: *Environmental impact statements, *Marmaton River (Kan).

The project provides for the construction of a dam and multipurpose lake on the Marmaton River in Bourbon County, Kansas. A multilevel outlet will be included in the dam for water quality and water supply releases. The project will control the drainage of 279 square miles and will involve the purchase of 19,500 acres in fee simple acquisition and 600 acres in flowage easements. Environmental impact will include providing flood protection, water quality control, water supply storage, recreation and fish and wildlife enhancement, and encouraging intensified agricultural, residential and commercial development in the area. The lake will inundate 5,000 acres of land and eliminate 25 miles of the Marmaton River and tributary streams and associated fish and wildlife habitat. Alternatives considered include levees, limited channel works, and no action. Irreversible or irretrievable commitments of resources will include alteration of the free-flowing stream, permanent inundation of wildlife habitation in the lake site, and the man power and materials involved in the construction of the lake. (Widman-Florida)
W72-11180

JORDAN AQUEDUCT, BONNEVILLE UNIT, CENTRAL UTAH PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as PB-198 838D, $3.00 in paper copy, $0.95 in microfiche.

Descriptors: *Water supply, *Bonneville Dam, *Utah, *Environmental effects, *Aqueducts, Flumes, Pipelines, Water conveyance, Canal design, Canal embankments, Canal linings, Canal seepage, Hydraulics, Wildlife habitats, Fisheries, Aesthetics, Birds, Channels, Flow control.
Identifiers: *Environmental impact statements.

The Jordan Aqueduct project will be a part of the Bonneville Dam unit of the Central Utah Project. The aqueduct will be a buried pre-cast concrete pipeline 20.8 miles long which will run northward to the southern limits of Salt Lake City. The aqueduct is being constructed to deliver 3,000 acre feet per year with a subsequent capacity of 70,000 acre feet per year. Rehabilitation of the Provo River canal will be undertaken by raising the left bank, raising the walls of a flume, and lining 2.4 miles to prevent leakage in order to contain the aqueduct's upstream supply. No permanent adverse environmental effects are anticipated. Minor landscape disturbances will occur. Fish resources will be affected only during construction at the siphon crossing the Jordan River. Fishery resources will ultimately be enhanced in the Provo River due to increased flows. Temporary disruption of small game and bird habitats will occur during construction. Practical alternatives are limited to variations in design and location of the project. (Grant-Florida)
W72-11181

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, HOPKINS COUNTY IN KENTUCKY, TRADEWATER RIVER RC AND D PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W72-11184

EDEN WATERSHED, MISSISSIPPI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W72-11189

PROPOSED SANTA MARGARITA PROJECT, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as PB-202 300-D, $3.00 in paper copy, $0.95 in microfiche. July 1971. 12 p, 1 map.

Descriptors: *California, *Environmental effects, *Dam construction, *Multiple-purpose reservoirs, Reservoirs, Reservoir construction, Reservoir fisheries, Groundwater resources, Water resources development, Water storage, Multiple-purpose projects, Water supply, Wildlife habitats, Aquatic habitats, Riparian plants, Natural flow doctrine, Municipal water, Industrial water, Irrigation, Flood protection.
Identifiers: *Environmental Impact Statements.

The proposed project would involve construction of two mulitple-purpose dams on the Santa Margarita River about 75 miles southeast of Los Angeles. The project will impound, conserve and deliver natural river flows for water supply and irrigation purposes. Environmental impacts would include increased flood protection, increased agricultural productivity from irrigation, increased water-related recreational activities, slight impairment of water quality, loss of riparian vegetation, and some undetermined impact on marshland. Adverse effects would include inundation of riparian habitats, loss of wildlife habitat, construction scars, loss of hunting days for deer and upland game, increased automobile traffic, and reduction in sand replenishment for beaches at the mouth of the river. Alternatives considered include construction of only one dam and no construction. The two reservoir sites are irretrievable commitments of resources. (Grant-Florida)
W72-11190

Available from the National Technical Information Service as PB-200 441-D, $3.00 in paper copy, $0.95 in microfiche. November 1970. 10 p, 1 map.

Descriptors: *Georgia, *Dam construction, *Environmental effects, *Multiple-purpose projects, Flood control, Hydroelectric plants, Wildlife habitats, Water supply, Recreation, Fisheries, Stream fisheries, Regulated flow, Streamflow, Thermal stratification, Dissolved oxygen, Aeration, Aesthetics, Pumped storage, Impaired water quality, Water quality control.
Identifiers: *Environmental Impact Statements.

The Trotters Shoals project would involve construction of a concrete dam on the Savannah River between Georgia and South Carolina. The project

will also include recreational sites and facilities and four generating units. Also recommended, but not authorized are two pumped storage units. Other project purposes include fishery, incidental flood control, streamflow regulation, and water supply. Environmental impacts anticipated include inundation of 26,650 acres, flood control, loss of natural stream section, lower average water temperatures in warm months and higher average temperatures in cold months, stimulated oxygen depletion, and lengthened temperature stratification due to cold water discharges. Adverse environmental effects include loss of 26,650 acres of wildlife habitat, timber, and crops from inundation; loss of river fishery value and impairment of fish migration; water quality impairment due to lessened natural aeration; and loss of 30 miles of scenic river. Alternative measures considered include several alternative dam sites and construction of two smaller dams. (Grant-Florida)
W72-11191

WYNOOCHEE DAM AND LAKE, WYNOOCHEE RIVER, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB-200 798-D, $3.00 in paper copy, $0.95 in microfiche. July 1, 1971. 17 p, 1 map.

Descriptors: *Washington, *Dam construction, *Flood control, *Environmental effects, Area development, Concrete dams, Flow control, Multiple-purpose projects, Dam design, Recreation, Fisheries, Irrigation water, Industrial water, Aquatic habitats, Trout, Administrative agencies, Storage, Water resources development.
Identifiers: *Environmental Impact Statements.

The Wynoochee Project in Grays Harbor County of southwestern Washington would involve construction of a central concrete gravity dam for water supply, irrigation, flood control, recreation and fisheries enhancement. The project will provide 35,000 acres of water storage for flood control and assure a 385 c.f.s. flow during the low flow period at the Aberdeen diversion. The project will facilitate industrial use, irrigation and fishery enhancement. There will be a loss of resident stream fish habitat and anadromous trout spawning and rearing habitats. The natural stream production area inundated by the reservoir will be lost. The only feasible alternative would be abandonment of the project. The natural stream production area inundated by the reservoir will be lost. Coordination has been maintained with appropriate state, federal, county and local agencies. (Waldron-Florida)
W72-11192

PALATLAKAHA RIVER WATERSHED, FLORIDA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-203 472-D, $3.00 in paper copy, $0.95 in microfiche. October 13, 1971. 26 p, 1 fig.

Descriptors: *Florida, *Channel improvement, *Flood control, *Environmental effects, *Watershed management, Recharge, Ground water recharge, Aquifers, Floods, Flood damage, Water control, Structures, Erosing, Sediment discharge, Turbidity, Kaolinite, Flood protection, Erosion control, Sediment control.
Identifiers: *Environmental Impact Statements.

The project, in Lake County, Florida, proposes the installation of 19.4 miles of channel improvement and other structures on the Palatlakaha River watershed. The channel improvement along with grade stabilization structures and water control structures would reduce flood water damages on numerous citrus groves, farms and ranches. The installation of conservation land treatment measures would reduce erosion and sediment production areas. The increased bodies of open water would contribute to frost abatement and serve to recharge the Floridian Aquifer. Adverse environmental effects include the loss of present use on 185 acres of sloughs, marshes and open water to be used for spoil storage. Additional acreage would be lost to the channel area and recreation. Temproary turbidity problems would result. The river would be changed from a shallow meandering stream choked with aquatic plants to a new ecological balance normal to deeper rivers and streams. Alternatives included no action, flood zoning, public ownership of flood damage areas, and water conservation features without flood prevention. These were considered either ineffective or detrimental because of losses to the owner, the tax base and the vast labor pool. (Nielson-Florida)
W72-11201

COW CREEK WATERSHED, OKLAHOMA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. Watershed Planning Div.

Available from the National Technical Information Service as PB-202 906D, $3.00 in paper copy, $0.95 in microfiche. August 1971. 8 p, 1 fig.

Descriptors: *Oklahoma, *Environmental effects, *Flood control, *Channel improvement, Administrative decisions, Multiple-purpose projects, Flood plains, Flow augmentation, Environmental engineering, Flood protection, Water management (Applied), Project planning, Explosives, Explosions.
Identifiers: *Environmental Impact Statements.

This action is a Public Law 566 watershed to be carried out by local sponsors with federal assistance. The project is located near Comanche, Oklahoma, and will include a land treatment work supplemented by 46 floodwater retarding structures, one multipurpose structure with a recreation development, and 2.5 miles of stream channel clearing and snagging. The project will reduce floodwater damages to flood plain lands by about 70%. Public recreational opportunities will be provided by development of outdoor, water based facilities. Adverse effects will include disturbance of vegetative cover on about 192 acres during construction and some loss of agricultural production and wildlife habitat. Alternatives considered include continuing present agricultural use, letting land revert to less intensive uses, developing floodplain into publicly owned park or wildlife area, and development of picnic areas without water based activity potential. The level of protection provided by this project can be used as a base for additional measures of protection if the economic and political conditions demand a more intensive use of the flood plain. (Widman-Florida)
W72-11262

LAKE FOREST BEACH EROSION, ILLINOIS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.

Available from the National Technical Information Service as PB-204 663D, $3.00 in paper copy, $0.95 in microfiche. October 27, 1971. 18 p, 1 map, 2 append.

Descriptors: *Administrative decisions, *Environmental effects, *Beach erosion, *Adoption of practices, *Shore protection, *Illinois, Beaches, Coastal engineering, Soil erosion, Tidal effects, Waves (Water), Administration, Comprehensive planning, Coordination, Alternate planning, Maintenance, Decision making, Project planning.
Identifiers: *Environmental Impact Statements.

This project will include the removal of 30 feet of permeable steel sheet piling groin and its replacement with an impermeable section, the extension of this groin 80 feet, and the extension of another steel sheet piling groin 140 feet to prevent further erosion and to restore the eroded and damaged beach at Forest Park in Lake Forest, Lake County, Illinois. Environmental effects include the prevention of continued degradation and ultimate loss of a significant portion of public beach by stabilizing and improving the shoreline and encouraging the healthful recreation of people. The adverse environmental effects will include a temporary reduction of the total amount of beach material presently nourishing and maintaining the downdrift shore. Alternatives include no development or other shore protection methods, such as replacement of beach sand in addition to construction of the authorized groins, construction of a seawall or revetment, or continual beach nourishment. Appendixed is the Illinois Shore of Lake Michigan Beach Erosion Control Study, which includes estimated costs of the Lake Forest project. (Widman-Florida)
W72-11264

OCEAN OUTFALL EXTENSION PROJECT, CARMEL SANITARY DISTRICT, CARMEL, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, San Francisco, Calif., and California State Water Control Board, San Francisco.
For primary bibliographic entry see Field 05E.
W72-11266

NAHUNTA SWAMP BASIN, WAYNE AND GREENE COUNTIES, NORTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.

Available from the National Technical Information Service as PB-202 587D, $3.00 in paper copy, $0.95 in microfiche. February 19, 1971. 20 p, 4 plate, 5 tab.

Descriptors: *North Carolina, *Channel improvement, *Flood control, *Environmental effects, *Reservoir storage, Reservoirs, Water storage, Flood damage, Water control, Excavation, Anadromous fish, Drainage, Fishing, Recreation, Turbidity, Crops, Crop protection, Flood protection.
Identifiers: *Environmental Impact Statements.

This action involves the construction of a flood control project on Nahunta Swamp, in Wayne and Greene Counties, North Carolina. The project would include channel improvement and construction of a flood-storage reservoir. The basin is located in a rural and predominantly agricultural area and the cropland is subject to floods when the channel is overflowed. Damage to crops is extensive. The completed project would reduce the average annual damages to the crops by about 87 percent. The project would provide flood control and drainage benefits to farmers in the area. Channelization would be done during periods when the stream is not being used as a spawning area for anadromous fishes. The permanent pool of the flood control reservoir would create a warm-water fish habitat and fishing opportunities in the basin. The project would result in temporary turbidity in the stream. Alternatives considered were channel improvements without reservoirs and reservoirs without channel improvements. These alternatives were shown to be either more costly than the proposed project or not sufficiently effective in providing flood protection. (Nielson-Florida)
W72-11267

SCAPPOOSE DRAINAGE DISTRICT, OREGON, PROPOSED IMPROVEMENTS, FLOOD PROTECTION (DRAFT ENVIRONMENTAL IMPAC STATEMENT).
Army Engineer District, Portland, Oreg.

Available from the National Technical Information Service as PB-198 847D, $3.00 in paper copy, $0.95 in microfiche. April 2, 1971. 19 p, 1 map.

Descriptors: *Oregon, *Levees, *Canal construction, *Environmental effects, *Drainage districts, Levee districts, Drainage area, Coordination, Flood control, Multiple-purpose projects, Flood protection, Excavation, Pumping plants, Turbidity, Disposal, Spoil banks.
Identifiers: *Environmental Impact Statements.

The project will greatly increase the flood protection capabilities of the levee system in Columbia County, Oregon. Work will consist principally of canal excavation and miscellaneous construction activities associated with pumping stations and drainage structures. Excess material from canal excavation will be disposed of along stream banks in areas of lower elevation. All disturbed and construction areas will be seeded. Adverse environmental effects include temporary increase in turbidity and some minimum impact on fish and wildlife. Alternatives considered were construction of a new main pumping station and 'no action.' (Widman-Florida)
W72-11268

CLARKS FORK--BULLOCKS CREEK WATERSHED, SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W72-11269

PLANS FOR PROTECTION OF PAULSBORO REFINERY DOCKING AREA FROM TIDAL CURRENTS: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Miss.
For primary bibliographic entry see Field 08B.
W72-11301

LOCK CULVERT OUTLET BASINS - HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Miss.
J. H. Ables, Jr., and M. B. Boyd.
Available from NTIS, Springfield, Va. 22151 as AD-733 848 Price $3.00 paper copy; $0.95 microfiche. Miscellaneous Paper No 2-794, February 1966. 8 p, 8 plate, 7 tab.

Descriptors: *Hydraulic models, *Navigation, *Locks, *Ohio River, *Hydraulic design, Engineering structures, Diversion structures, Drops (Structures), Water levels, Streamflow, Channel morphology.
Identifiers: *Lock culvert, Outlet basins.

At several of the new Ohio River locks, difficulty has been experienced in fully emptying the lock chamber when riverflow conditions were near the maximum locking stage. Generalized tests of a typical lock culvert outlet basin were conducted in a 1:25 -scale model to investigate the feasibility of basin modifications to reduce the residual head across the lower miter gates. The predominant positions of the outlets at the Ohio River projects are normal to the lock wall and turned slightly downstream at a 65-degree angle to the wall. Tests with the outlet in these positions indicate that construction of the basic outlet walls so that their tops will be above the riverbed, or addition of vertical wall extensions, will result in a lowering of the lock chamber water-surface elevation. Test data also show that no advantage results from turning the outlet basin downstream (parallel to the lock wall). (Woodard-USGS)
W72-11302

ADEQUACY OF SUBMERGED ROCK WEIRS TO WITHSTAND PROPELLER WASH, ST. CLAIR RIVER, MICHIGAN: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Miss.
For primary bibliographic entry see Field 08B.
W72-11303

SIMULATION TECHNIQUE FOR SUSPENDED AND BED LOAD FOR SILT EJECTOR,
Central Water and Power Research Station, Poona (India).
C. V. Gole, S. V. Chitale, and K. S. Rajagopalan.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol. 1, Paris, France, p 25-32, Aug-Sept 1971. 4 fig, 1 tab, 3 ref, append.

Descriptors: *Suspended solids, *Bed load, *Sediment control, Sediments, Canals, Model studies, *Sediment transport, *Sedimentation.
Identifiers: *Ejectors, Test results, Sediment concentration, Sediment excluders, *Sedimentary similitude, Karman constant, India.

Arrangements for exclusion of sediment entering a canal are normally made at the diversion works, However, sediment concentration in the canal can still be excessive. A sediment ejector consisting of a number of tunnels across the canal near the bottom can be provided for sediment removal from the bottom layers. The escape discharge through the ejector tunnels is returned either to the river downstream of the diversion structure or to a drainage channel. Model tests were conducted on a geometrically similar model of the ejector on the East Kosi main canal. The hydraulic performance and efficiency of the ejector were studied. The simulation technique for suspended and bedloads is presented. Distribution of suspended sediment along the vertical profile was simulated by reproduction of a Z value, which is a ratio of the fall velocity to Karman mixing length coefficient and the shear velocity. The proportion of bedload to suspended load was simulated on the basis of Laursen's function. Experiments indicated a 35 to 50% increase in ejection efficiency could be attained by flattening the ramp slope immediately upstream of the ejector tunnel mouth. (USBR)
W72-11356

AERATION MITIGATES CAVITATION IN SPILLWAY TUNNEL,
Bureau of Reclamation, Denver, Colo.
D. Colgate, and J. Legas.
Preprint, American Society of Civil Engineers National Water Resources Engineering Metting, Atlanta, Ga., Jan 1972. 29 p. 10 fig.

Descriptors: *Cavitation, *Air entrainment, *Spillways, *Tunnels, *Damages, Hydraulic models, Erosion, Tunnel failure, Tunnel linings, Montana, Aeration, Prototypes.
Identifiers: Yellowtail Dam (Mont), Missouri River Basin Project, Model tests, Test results, Cavitation control, Spilling.

In 1967, sustained operation of Yellowtail Dam spillway tunnel caused cavitation damage to the concrete lining and, in 2 areas, advanced through the lining into the foundation rock. Described are: tunnel conditions prior to spill, operation during spill, resulting damage, repairs, construction of an air slot to introduce air along flow surfaces, the laboratory model used to optimize the location and configuration of the air slot, and prototype tunnel tests. Prototype tests of the spillway tunnel confirmed the results of hydraulic model tests relating to location and configuration of the aeration slot constructed to mitigate the damaging effects of cavitation. The prototype tests indicated that to prevent cavitation erosion, a sufficient volume of air was being supplied to flow surfaces in the vertical bend of the tunnel and in the tunnel reach immediately downstream from the bend. The 1970 test included, in critical areas of the lining, known surface irregularities duplicating the location and size of the surface irregularities which initiated heavy cavitation-induced damage during the demand spillway operation in the summer of 1967. (USBR)
W72-11367

INVESTIGATION OF NONMETALLIC WATERSTOPS: REPORT 8. EFFECT OF SPECIMEN SIZE AND LOW TEMPERATURE ON WATERSTOP TEST RESULTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08C.
W72-11465

VENTURA MARINA, VENTURA COUNTY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.

Available from the National Technical Information Service as PB-204 166D, $3.00 in paper copy, $0.95 in microfiche. November 5, 1971. 26 p, 1 map, 1 illus, 4 photo.

Descriptors: *Dredging, *California, *Environmental effects, *Breakwaters, *Marinas, Coastal structures, Harbors, Recreation facilities, Barriers, Concrete structures, Shore protection, Multiple-purpose projects, Administrative decisions, Comprehensive planning, Retaining walls, Project planning, Sport fishing, Boating, Navigation.
Identifiers: *Environmental Impact Statements, *Ventura Marina (Calif).

This project involves construction of a detached breakwater, dredging to form a sandtrap in the lee of the breakwater, construction of recreation facilities for sport fishing, construction of parking lots and sanitation facilities, and maintenance of general navigation features of a marina. The project, located in Ventura County, California, will provide a suitable and safe entrance to the marina for year-round boating activity. The breakwater construction will create sport fishing conditions from the jetty heads. The project will result in the direct loss of some marine biota. If increased navigation and development of the area is not controlled, such additional environmental problems as increased water and air pollution, and encroachment upon sand dunes and water marshes would result in the elimination of many species of marsh vegetation, waterfowl and wildlife. The structural alternatives that were considered would not have any environmental advantages over the recommended plan. A 'do nothing' alternative and non-structural alternatives were considered infeasible. (Widman-Florida)
W72-11507

BETHEL SMALL-BOAT HARBOR, BETHEL, ALASKA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 04A.
W72-11508

FALMOUTH LAKE, LICKING RIVER, KENTUCKY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.

Available from the National Technical Information Service as PB-203 221D, $3.00 in paper copy, $0.95 in microfiche. October 9, 1970. 4 p.

Descriptors: *Ohio River, *Dam construction, *Flood control, *Environmental effects, *Water supply development, Floods, Water storage, Flood damage, Flood protection, Flood plain zoning, Flood forecasting, Channel improvement, Dams, Recreation, Recreation facilities, Water supply, Wildlife, Wildlife habitats, *Kentucky, Ohio.
Identifiers: *Environmental Impact Statements, *Falmouth Lake (Kent).

The project would contribute to reduction of flood damages at Falmouth, Kentucky, and the Covington-Cincinnati area by the construction of a dam on the Licking River approximately nine miles upstream from Falmouth. The dam and lake would control an extensive drainage area and serve as a unit of the plan for flood control in the Ohio River basin. The conservation pool would provide recreational opportunities and fish and wildlife benefits. It would also serve as storage for water supply. The maintenance of a seasonal pool would inundate over 12,000 acres of land. Some 75 miles of free-flowing stream will be converted to slack water impoundment. Habitat carrying capacities for all upland-game and upland-fur species except raccoon would be reduced. Alternative structural measures involved levee alignments and channel improvements. These would not reduce flood damages on the Ohio River nor contribute to recreation or water supply enhancement. Nonstructural measures such as flood plain zoning, evacuation of the flood area, flood forecasting and flood insurance were considered but rejected. (Nielsen-Florida)
W72-11509

ARKANSAS-RED RIVER BASINS WATER QUALITY CONTROL STUDY--PART I, AREAS VII, VIII AND X, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 05G.
W72-11510

KANAWHA RIVER COMPREHENSIVE BASIN STUDY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Kanawha River Basin Coordinating Committee, Huntington, W. Va.
For primary bibliographic entry see Field 04A.
W72-11511

PEARL RIVER, MISSISSIPPI AND LOUISIANA--NAVIGATION (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.

Available from the National Technical Service as PB-202 074D, $3.00 in paper copy, $0.95 in microfiche. April 23, 1971. 6 p, 1 plate, 1 map.

Descriptors: *Louisiana, *Environmental effects, *Channel improvement, *Cutoffs, Dredging, Turbidity, Siltation, Project benefits, Project purposes, Navigation, Water resources development, Deposition (Sediments), Wildlife habitats, Land use, River basin development, Disposal.
Identifiers: *Environmental impact statements, *Pearl River.

This project consists of channel improvement by means of cutoffs and easement of bends at eight locations in the Pearl River at St. Tammary Parish, Louisiana. Construction will relieve the navigation difficulties which exist due to the winding channel. Approximately 250 acres of cypress bottomland, swamps, and low salt marsh areas will be required for the cutoffs and spoil disposal. Adverse environmental effects would include a temporary loss of wildlife habitat along the banks from spoil disposal. Turbidity and increases in siltation will have localized adverse effects on the aquatic environment. The only alternative considered would be no project. The project will enhance short-term use of the area through increased navigation efficiency, and no significant lasting effect will alter the long-term productivity of the area. The only irreversible commitment of resources will be the 250 acres utilized for the cutoffs and spoil disposal. (Brackins-Florida)
W72-11513

BUFFALO CREEK AT MEADOW GROVE, NEBRASKA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Neb.
For primary bibliographic entry see Field 04A.
W72-11529

WILLOW ISLAND LOCKS AND DAM, OHIO RIVER, OHIO AND WEST VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.

Available from the National Technical Information Service as PB-202 310D, $3.00 in paper copy, $0.95 in microfiche. June 15, 1971. 39 p, 1 map, 1 dwg, 13 tab, append.

Descriptors: *Environmental effects, *Ohio River, *Dams, *Dredging, Dam construction, Flood control, Flood protection, Channel improvement, Excavation, Multiple-purpose projects, Replacement costs, Comprehensive planning, Project planning, West Virginia, Ohio, Turbidity, Locks, Spoil banks, Recreation.
Identifiers: *Environmental Impact Statements.

The project would involve construction of a high-lift, non-navigable, gated dam with a main and auxiliary lock; removal of three existing locks and dams; dredging required to utilize the new structure; and establishment of public access areas. The dam site is on the Ohio River about 3.4 miles upstream from Waverly, West Virginia, with the locks on the Ohio side of the river. Environmental impacts would include consolidation of pools of three low-lift dams to a single pool, changing the regimen of the river and lower reaches of tributary streams, inundating 790 acres of land, selective clearing of 1,200 acres of land, and changing biotic habitats. Adverse environmental effects would include inundation of land along the riverbank and on islands, deposition of soil on islands and riverside lands, removal of trees and shrubs along the shoreline with resultant loss of biotic habitat, reduction of dissolved oxygen content of the river, increased pollution potential resulting from increased barge and pleasure craft use, temporarily increased turbidity and sedimentation during construction, and potential for environmental problems associated with industrialization indirectly enhanced by the project. No apparent economically or structurally feasible alternative methods exist. (Widman-Florida)
W72-11531

SMALL NAVIGATION PROJECT, ANDREWS RIVER, HARWICH, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Waltham, Mass., New England Division.

Available from the National Technical Information Service as PB-202 919D, $3.00 in paper copy, $0.95 in microfiche. June 19, 1971. 52 p, 10 plate, 7 photo, 3 tab, append.

Descriptors: *Massachusetts, *Dredging, *Environmental effects, *Jetties, *Shore protection, Beach erosion, Erosion, Erosion control, Decision making, Comprehensive planning, Multiple-purpose projects, Project planning, Shoals, Turbidity, Channel improvement, Recreation, Aesthetics, Maintenance.
Identifiers: *Environmental Impact Statements, *Andrews River (Mass).

This project will involve the construction of a jetty and retaining wall on the Andrews River in Harwich, Massachusetts, to prevent shoaling of the entrance channel. Dredging and maintenance of the structure will also be necessary. Environmental impacts would include possible short term turbidity associated with the dredging, increased development of recreational resources, prevention of further beach erosion, and improved aesthetic view due to new beach area. The only alternative is no development. The only irretrievable commitment of resources would be the labor required for construction and maintenance. Included is an evaluation study of a previously deferred jetty project for this area. (Widman-Florida)
W72-11532

LONG LAKE AREA, HELENA, ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.

Available from the National Technical Information Service as PB-202 803D, $3.00 in paper copy, $0.95 in microfiche. July 1971. 6 p, 1 map.

Descriptors: *Arkansas, *Environmental effects, *Dredging, *Channel improvement, Flood control, Comprehensive planning, Multiple-purpose projects, Culverts, Coordination, Environmental engineering, Mississippi River, Bayous, Levees, Silts, Agricultural chemicals, Wildlife habitats, Recreation, Crop production.
Identifiers: *Environmental Impact Statements, *Long Lake (Ark).

The project would require construction of a gated culvert through the main line Mississippi River Levee, an outlet channel and plug, and enlargement and cleanout of 5.6 miles of bayou in Phillips County, Arkansas. The proposed project will increase income available to farmers in the project area through a reduction in flood damages to cultivated lands, increase yields on these lands, and convert low-lying woodlands to crop production. The diversion of waters laden with silt, herbicides, and other agricultural chemicals should improve and enhance biological, recreational, and aesthetic values. Cleanout and enlargement of part of the bayou will result in the loss of the existing aquatic biota, including any associated commercial and sport fishing values. Conversion of woodlands to croplands and clearing of the required right-of-way will result in losses in small game and degrading of aesthetic values. Alternatives considered include additional channel enlargement and cleanout, and no development. (Widman-Florida)
W72-11533

DAVIDS CREEK LAKE, EXIRA, IOWA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Neb.

Available from the National Technical Information Service as PB-202 909D, $3.00 in paper copy, $0.95 in microfiche. June 7, 1971. 19 p, 1 map, 5 tab.

Descriptors: *Iowa, *Dam construction, *Environmental effects, *Flood control, Multiple-purpose projects, Water management (Applied), Environmental engineering, Dams, Earth dams, Artificial lakes, Recreation, Migratory birds, Natural streams, Wildlife management, Flood protection, Project planning.
Identifiers: *Environmental Impact Statements, *Davids Creek Lake (Iowa).

The proposed flood protection plan consists of a dam and lake on Davids Creek approximately 1/2 mile north and east of Exira, Iowa. An earthfill dam having a height of 62 feet above the valley floor and a crest length of 2400 feet with a top width of 30 feet would be constructed. The recommended project includes recreational areas and facilities at selected locations adjacent to the conservation pool and development of the upper reaches of the reservoir as a wildlife management area. The environment would be benefited by the flood reduction and by the recreational development of project properties. The lake would improve the reliability of the well fields and is expected to attract migratory waterfowl. The project would require the resettlement of 24 families and would take approximately 3000 acres out of agricultural production. The aesthetic values associated with a natural stream would be lose. Aquatic plant growth may be excessive and detract from the lake's intended recreational use. Alternatives considered were floodplain zoning, channel improvement, levees, storage in remote areas, single-purpose dam, and no development. (Widman-Florida)
W72-11534

AN APPLICATION FOR MAJOR LICENSE FILED BY APPALACHIAN POWER COMPANY FOR CONSTRUCTED BYLLESBY AND BUCK HYDROELECTRIC PROJECT NO. 2514-VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Federal Power Commission, Washington, D.C. Bureau of Power.

Available from the National Technical Information Service as PB-202 716D, $3.00 in paper copy, $0.95 in microfiche. September 21, 1971. 22 p, 1 fig, 4 append.

Descriptors: *Virginia, *Federal Power Act, *Hydroelectric plants, *Environmental effects, *Permits, Administrative agencies, Regulation, Hydroelectric power, Comprehensive planning, Multiple-purpose projects, Administrative decisions, Project planning, Dams, Spillways, Reservoirs, Sluices.
Identifiers: *Environmental Impact Statements.

The proposed action is an application for license to the Federal Power Commission for two constructed projects located on the New River in Carroll County, Virginia. The Byllesby Development consists of a dam composed of a spillway section, two trash sluice sections, and an integral dam and powerhouse section; a side channel spillway connected to the integral dam and powerhouse; a reservoir; and an integral powerhouse containing four generating units. The Buck Development includes a dam composed of trash sluices and an integral dam and powerhouse; a separate spillway composed of tainter gate sections and flashboard sections; a reservoir; and an integral powerhouse containing three generating units. The applicant proposes to reserve land upstream from the Byllesby Dam for possible recreational development. Continued operation of the project should have no further significant effects on the aquatic or land forms utilizing project areas. Alternatives are denial or granting a license with added safeguards for environmental protection. Attached are the application and comments by interested federal and state agencies. (Widman-Florida)
W72-11535

LITTLE CEDAR CREEK, COOSA RIVER BASIN, GEORGIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W72-11537

POINT LOOKOUT STATE PARK, ST. MARY'S COUNTY, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as PB-202 793D, $3.00 in paper copy, $0.95 in microfiche. July 1, 1971. 6 p, 1 map, 3 dwg.

Descriptors: *Maryland, *Beach erosion, *Chesapeake Bay, *Environmental effects, *Dredging, Erosion, Channel improvement, Soil erosion, Stream stabilization, Soil conservation, Administrative decisions, Multiple-purpose projects, Project planning, Erosion control, Marinas, Parks, Bulkheads, Navigation.
Identifiers: *Environmental Impact Statements, *Point Lookout State Park (Md).

This navigation improvement will provide for a channel 100 feet wide and 6 feet deep from the Potomac River to the proposed part marina in Lake Conoy, Maryland. The inlet will be protected on both sides by bulkheads, and a stone jetty will be provided along the northwest side of the channel. Beach erosion control along the Chesapeake Bay shoreline will consist of timber and steel bulkheads. Stone will be placed at the base of the bulkheads to prevent scour, and a concrete splash apron will be constructed to reduce damage from wave overtopping. Environmental impacts will be locally improved fishing conditions, improved recreation potential of the state park, and the development of a harbor for refuge. Adverse environmental effects include loss of natural lake bottom and vegetation, the short-term disturbance of dredged areas, and the location of a spoil disposal site. Alternatives considered were improvement of the existing inlet channel or no development. (Widman-Florida)
W72-11538

BOXELDER CREEK WATERSHED, COLORADO AND WYOMING (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C. Watershed Planning Div.

Available from the National Technical Information Service as PB-202 072-D, $3.00 in paper copy, $0.95 in microfiche. July 26, 1971. 8 p.

Descriptors: *Colorado, *Wyoming, *Watersheds (Basins), *Environmental effects, *Flood control, Channel stabilization, Adoption of practices, Decision making, Erosion, Environmental engineering, Multiple purpose projects, Flood protection, Watershed management, Land management, Stabilization, Flood frequency, Dams, Spillways.
Identifiers: *Environmental Impact Statements, *Boxelder Creek Watershed.

This watershed project, located in Larimer and Weld Counties, Colorado, and Albany and Laramie Counties, Wyoming, will consist of conservation land treatment supplemented by five floodwater-retarding structures and one stabilization structure. Project action will reduce average flood damages by 85%, protect homes and businesses from a 100-year frequency storm, reduce sedimentation in irrigation reservoirs by 77%, and reduce overflow deposition by 95%. The project will also reduce flood plain erosion by 90%, improve general farming and range conditions and wildlife habitat, and provide increased fire protection to range and forestland. Adverse environmental effects would include elimination of agricultural and wildlife land to be used for dams and spillways, periodic interruption of agricultural and wildlife use of 900 acres of dry cropland, disruption of irrigated cropland and rangeland which will be occupied by the sediment and detention pools of planned structures, and periodic inundation of a trout stream and intermittent flow channels. Alternatives considered include intensive use of flood plain for urban and commercial purposes, less intensive use of flood plain areas, and flood plain zoning and management in lieu of structural measures. (Widman-Florida)
W72-11540

LEVEE PROTECTION AND STREAM IMPROVEMENTS, SUGAR CREEK, AT AND IN THE VICINITY OF BREWSTER, OHIO (DRAFT ENVIROMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.

Available from the National Technical Information Service as PB-200 340D, $3.00 in paper copy, $0.95 in microfiche. May 14, 1971. 7 p.

Descriptors: *Ohio, *Environmental effects, *Flood protection, *Channel improvement, Levees, Pumping plants, Flood control, Stream improvement, Stream stabilization, Flow characteristics, Erosion rates, Turbidity, Sedimentation rates, Wildlife habitats, Project planning.
Identifiers: *Environmental Impact Statements, *Sugar Creek (Ohio).

The project will consist of modification and construction of levees and installation of a pumping station at Brewster, Ohio. Also included will be snagging and clearing to improve flow characteristics. The project will greatly reduce the risk of flooding in the area. Loss of some farmland and fish and wildlife habitat and temporarily increased erosion and sedimentation are the significant adverse effects. In addition to the alternative of no improvement, consideration was given to relocation or raising part of the village, acquisition of land and improvements, flood proofing existing structures, and modification of operating procedures of Beach City Dam. The lands required for the revisions to the levee and borrow and spoil areas will be irreversibly committed. (Widman-Florida)
W72-11541

ST. FRANCIS BASIN, MISSOURI AND ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.

Available from the National Technical Information Service as PB-200 339D, $3.00 in paper copy, $0.95 in microfiche. June 18, 1971. 23 p, 1 map.

Descriptors: *Missouri, *Arkansas, *Environmental effects, *Flood protection, *Drainage area, Administrative decisions, Detention reservoirs, Channel improvement, Floodways, Pumping plants, Flood control, Multiple-purpose projects, Water management (Applied), Vectors (Biological), Turbidity, Crop production, Overflow, Ditches.
Identifiers: *Environmental Impact Statements, *St. Francis Basin.

Project features include a detention reservoir, channel enlargement and realignment, a leveed floodway, pumping stations, control structures, and improvement of tributary ditches in the St. Francis Basin of Missouri and Arkansas. Continuation of this project will contribute to the general well being of both urban and rural residents throughout the St. Francis Basin. Homes and businesses will be subject to reduced frequency and duration of flooding. Improved crop yields will increase per capita income, thus raising standards of living to a level more in line with the rest of the nation. Though construction will cause temporary increases in water turbidity, the reduced frequency of overbank flows should improve water quality by a reduction in sediment and agricultural pollutants. Vector problems presently associated with overflow conditions will be greatly reduced. Woodland and wildlife losses will result from the project, and physical alteration of stream and existing ditch channels will have an overall adverse effect upon fishing. Alternatives considered include reservoir construction, flood plain management, and project abandonment. (Widman-Florida)
W72-11542

COPAN LAKE, LITTLE CANEY RIVER, OKLAHOMA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.

Available from the National Technical Information Service as PB-200 337D, $3.00 in paper copy, $0.95 in microfiche. December 21, 1970. 33 p.

Descriptors: *Oklahoma, *Flood protection, *Environmental effects, *Dam construction, *Lakes, Dams, Flood control, Multiple-purpose projects, Project planning, Water management (Applied), Water quality control, Water supply, Recreation, River basin development, Sport fishing, Impoundments.
Identifiers: *Environmental Impact Statements, *Copan Lake (Okla).

The project is comprised of a flood control, water quality control, water supply, fish and wildlife, and recreation lake located in Washington County, Oklahoma. This project will reduce annual flood damages in the river basins downstream from the dam. Downstream water releases will provide improved water quality. The lake will provide water supply for future municipal and industrial development in the region. Water oriented recreational ac-

tivities will be provided as well as good quality sport fishing. The overall status of the prairie chicken, considered rare and endangered nationally, is expected to be unaffected by the project. The maintenance of the conservation pool will inundate 4850 acres. The lake will cover 14 miles of natural stream. Some marginal oil production will also be terminated. Several buildings, highways, county roads, railroads, utilities, and two cemeteries will be affected by the project. Alternatives considered include diversion, levees, channel enlargement, channel rectification, nonstructural measures, and no development. (Widman-Florida)
W72-11544

MILLS RIVER DAM AND RESERVOIR (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Office of Health and Environmental Science, Chattanooga.

Available from the National Technical Information Service as PB-200 396D, $3.00 in paper copy, $0.95 in microfiche. June 29, 1971. 24 p, 5 fig, 1 tab, 1 append.

Descriptors: *North Carolina, *Environmental effects, *Dam construction, *Reservoir construction, *Flood protection, Reservoirs, Flood control, Dams, Comprehensive planning, Water management (Applied), Multiple-purpose projects, Land management, Wildlife habitats, Recreation, Impoundments, Turbidity, Project construction.
Identifiers: *Environmental Impact Statements, *Mills River Reservoir (N.C.).

The action would include construction of a dam and reservoir in Henderson County, North Carolina. The dam and 600 acre reservoir are expected to result in significant beneficial land use gains including new recreation uses and the more productive use of agricultural and urban lands now subject to flooding. Some temporary increases in turbidity are expected during the construction phase. Some minor wildlife habitat losses will result, along with loss of the availability of the impounded area for timber and agricultural use. A number of alternative sites or combination of sites were considered. Irreversible and irretrievable commitments of resources consist primarily of the land and water use commitments inherent in the impoundment of the river and the commitments of materials used in project construction. (Widman-Florida)
W72-11545

SMALL BOAT HARBOR, PORTSMOUTH STATE PARK, OHIO, OHIO RIVER (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Huntington, W. Va.

Available from the National Technical Information Service as PB-198 883D, $3.00 in paper copy, $0.95 in microfiche. March 24, 1971. 6 p.

Descriptors: *Ohio, *Ohio River, *Environmental effects, *Dredging, *Harbors, Excavation, Recreation facilities, Bulkheads, Channel improvement, Shore protection, Boat launching ramps, Parks, Recreation, Boating, Sewage treatment, Spoil banks, Parks, Project planning.
Identifiers: *Environmental Impact Statements, *Ohio River.

The proposed project consists primarily of developing a harbor adjacent to the Ohio River in Scioto County, Ohio, to provide docking and berthing facilities for recreational boats. The harbor will be created by excavating the low-lying flood plains at the confluence of existing streams. The project will include construction of a stone revetment and a bulkhead of sheet piling. A portion of the excavated material will be deposited on lands of the proposed state park and remaining material will be spoiled on the park lands. Also provided will be a boat launching ramp, parking facilities, a picnic area, restrooms, and a sewage treatment plant. Unavoidable adverse effects would include disruption of the ecosystem due to removal of some vegetation, excavation of the harbor, minor filling of low lying areas, and temporary increases in turbidity during construction. Alternatives considered include no project and alternate locations for the harbor. (Widman-Florida)
W72-11547

LEWIS AND CLARK CONNECTING CHANNEL, OREGON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.

Available from the National Technical Information Service as PB-199 881D, $3.00 in paper copy, $0.95 in microfiche. March 31, 1971. 11 p, 1 map.

Descriptors: *Oregon, *Environmental effects, *Channel improvement, *Columbia River, Excavation, Waterfowl, Wildlife habitats, Dredging, Navigation, Lumbering, Vegetation effects, Vegetation regrowth, Aesthetics, Estuaries, Fisheries, Disposal, Project planning.
Identifiers: *Environmental Impact Statements, *Lewis and Clark River.

The project would involve construction of a navigation channel in Clatsop County, Oregon. The channel will be 10 feet deep and 4.5 miles long and will extend from the existing Young River channel to the mouth of the Lewis and Clark River. The area is mountainous and heavily timbered; the lowlands are largely agricultural. The project will provide safe and adequate passage beneficial to both commercial and recreational navigation interests. Environmental impact of the project would include excavation and disposal of approximately 227,000 cubic yards of material and alteration of vegetative cover, elevation, and appearance of the spoil area. The vegetation is expected to grow back and not be permanently lost. Adverse environmental effects include some damage to the river fishery from dredging and loss of waterfowl habitat in the spoil areas. Alternatives include no construction and varying channel dimensions. (Grant-Florida)
W72-11549

THE DUCK RIVER PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Office of Health and Environmental Science, Chattanooga.

Available from the National Technical Information Service as PB-200 442D, $3.00 in paper copy, $0.95 in microfiche. June 30, 1971. 35 p, 5 fig, append.

Descriptors: *Tennessee Valley Authority, *Land use, *Flood control, *Dam construction, *Environmental effects, Tennessee, Recreation, Rural areas, Flood protection, Reservoirs, Agricultural watersheds, Turbidity, Multiple-purpose projects, Administrative agencies, Federal government, River basin development, Water resources development.
Identifiers: *Environmental Impact Statements, *Duck River (Tenn).

The project calls for construction of two dams and reservoirs, one in Bedford and Coffee Counties and the other in Maury and Marshall Counties, Tennessee. The dams and reservoirs are expected to result in significant land use gains including new recreation uses and the more productive use of agricultural and urban lands now subject to flooding. The project will involve the loss of about 20,000 acres within the reservoir maximum flood zones. Some increase in stream turbidity will result from construction. Alternatives investigated include taking no action, taking action which does not involve multipurpose water resource development, undertaking multipurpose water resource development of a different design, and building only one unit. Irreversible and irretrievable commitments of resources consist primarily of the land and water use commitments inherent in the impoundment of the river and the commitments of materials used in project construction. (Waldron-Florida)
W72-11550

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 05D.
W72-11555

GREELEY, COLORADO--EPA PROJECT NO. COLO-261 (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W72-11558

PROPOSED CONCRETE LINING OF MAIN OUTLET DRAIN, SOUTH GILA VALLEY, COLORADO RIVER FRONT AND LEVEE SYSTEM, ARIZONA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nevada. Region 3 Office.

Available from the National Technical Information Service as PB-206 102D, $3.00 in paper copy, $0.95 in microfiche. January 1972. 39 p, 5 map, 2 photo.

Descriptors: *Arizona, *Environmental effects, *Concrete construction, *Dam construction, *Linings, Alternate planning, Multiple-purpose projects, Administrative agencies, Levees, Water quality control, Water management (Applied), Seepage, Groundwater basins, Project planning, Watershed management.
Identifiers: *Environmental Impact Statements, *Gila River (Ariz).

The proposed project, located in Yuma County, Arizona, would line the 8 mile long Main Outlet Dam with concrete. This will stop seepage of saline water into the ground-water basin, thereby allowing improvement of the water quality delivered to Mexico and eliminating the deterioration of the ground water in the South Gila Valley. Present spoil banks will be eliminated and the drain channel will be narrowed, making more land available for other uses. There will be little adverse effect on recreation or wildlife programs in the area. There will be a temporary adverse effect on spawning habits of fish presently using the unlined drain. Construction will require additional fill material to be obtained from the Gila River flood plain. Drainage water will be bypassed in the Gila River Pilot Channel during construction. Alternatives considered were no construction, construction of a new concrete-lined drain north of the South Gila Levee, and construction of a new concrete-lined drain south of the existing unlined drain. (Widman-Florida)
W72-11560

8B. Hydraulics

RECLAMATION AND WATER MANAGEMENT (MELIORATSIYA I VODNOYE KHOZYAYSTVO).
Ministerstvo Melioratsii i Vodnogo Khozyaistva Ukrainskoi, Kiev (USSR).
For primary bibliographic entry see Field 05D.
W72-11120

GREAT LAKES CONNECTING CHANNELS, WIDENING AND DEEPENING BENDS IN ST.

MARY'S RIVER, MICHIGAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 04A.
W72-11175

CEDAR BAYOU, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W72-11183

VARIATION OF BED FORM AND FLOW RESISTANCE IN ALLUVIAL CHANNELS,
Illinois University, Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02J.
W72-11285

PLANS FOR PROTECTION OF PAULSBORO REFINERY DOCKING AREA FROM TIDAL CURRENTS: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Miss.
W. H. Bobb.
Available from NTIS, Springfield, Va. 22151 as AD-734 098 Price $3.00 paper copy; $0.95 microfiche. Miscellaneous Paper No 2-797, February 1966. 43 p, 1 plate, 35 photo, 1 tab.

Descriptors: *Hydraulic models, *Delaware River, *Docks, *Engineering structures, *Tidal effects, Currents (Water), Dikes, Protection, Ships, Oil industry, Evaluation, Design criteria.
Identifiers: *Paulsboro (N.J.), Oil tankers, Docking facilities.

Hydraulic model studies of the Delaware River were made to determine the feasibility of extending the marine docking facilities at Paulsboro, N.J. The extension downstream from the present installation would accommodate larger tankers, resulting in considerably more exposure of the docked tanker to strong cross currents off the mud flats to the south. Tests were undertaken to determine if such a dike would effectively divert the objectionable currents flowing almost perpendicular to a moored ship during the flooding phase of the tidal current. The model studies show that: (1) a dike constructed on the proposed alignment will divert flow from the mud flats to the south; (2) a dike of insufficient length could cause forces against a tanker moored in the proposed new location; (3) in order to obtain the maximum benefit from a dike on the alignment tested, the dike should be no less than 700 ft. in length; and (4) consideration should be given to shifting the dike location to the north in the direction of the pile-supported platform. (Woodard-USGS)
W72-11301

LOCK CULVERT OUTLET BASINS - HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Miss.
For primary bibliographic entry see Field 08A.
W72-11302

ADEQUACY OF SUBMERGED ROCK WEIRS TO WITHSTAND PROPELLER WASH, ST. CLAIR RIVER, MICHIGAN: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Miss.
J. L. Grace, Jr.
Available from NTIS, Springfield, Va. 22151 as AD-733 871 Price $3.00 paper copy; $0.95 microfiche. Miscellaneous Paper No 2-821, May 1966. 34 p, 1 fig, 5 plate, 1 tab, 17 photo.

Descriptors: *Hydraulic models, *Weirs, *Engineering structures, *Navigation, *Michigan, Rivers, Lake Huron, Harbors, Streamflow, Ships, Propellers, Testing, Washouts, Hydraulic design, Model studies.
Identifiers: *St. Clair River (Mich.), *Rock weirs.

A 1:20-scale model of submerged weirs, for modification of the discharge capacity of the St. Clair River, Michigan, was tested for effects of riverflow and propeller wash from passing ships. The conditions produced by riverflow and propeller wash from a ship moving downstream when the propeller was located 5 to 40 ft downstream of the weir center line were the most critical relative to the stability of the weirs. The effects on weir stability of riverflow only and of riverflow and propeller wash from ships moving upstream were insignificant compared to those created by riverflow and a ship moving downstream. Although stable weirs were developed utilizing the 50- to 90-lb stone capped with either precast units or large cover stone, selection of the most practicable weir design required investigation of the relative contractive effect and discharge characteristics of the submerged weirs. A mathematical expression describing the submerged-flow discharge characteristics of the weir is presented in addition to the graphical presentation of basic data. (Woodard-USGS)
W72-11303

LABORATORY INVESTIGATION ON HEAT TRANSFER IN THERMALLY STRATIFIED FLOW,
Polish Academy of Sciences, Gdansk. Inst. of Hydraulic Research.
W. Majewski.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol. 1, Paris, France, p. 207-216, Aug-Sept 1971. 7 fig.

Descriptors: *Heat transfer, *Stratified flow, *Thermal stratification, Laboratory tests, Flow, Thermal powerplants, Hydraulic models, Stratification, Hydraulics, Model tests, Turbulent flow, Nuclear powerplants, Water temperature, Heated water, Thermal properties, Thermal water, Fluid dynamics, Fluid mechanics, Outlets.
Identifiers: Poland, Stratified waters, Temperature distribution, Velocity distribution.

Heat transfer in flowing water is mainly caused by turbulent diffusion and mixing of warm and cold water. A description is given of a hydrothermal laboratory investigation to determine the mixing process and stability condtions in thermally stratified flow. Temperature and velocity distributions in 2-dimensional, uniform flow, and changes in temperature distribution along a hydraulic flume were determined. From experiments in the horizontal hydraulic flume, the influence of the depth of cold water layer on thermal phenomena was assessed. The depths of stratified flow were 0.50, 0.30, and 0.20 m. During the investigations, conditions varying from fully, 2-layered stratified flow to complete mixing of the warm and cold layers were achieved. Thermal stratification appears in rivers, canals, lakes, and reservoirs. Thermal stratification often exists in natural condtions, but usually appears near thermal and nuclear powerplants or other industrial establishments. The determination of water temperatures in several points or cross sections of a river or reservoir is particularly important in problems of biological life, water management, or ice conditions. (USBR)
W72-11357

OPTIMIZED GEOMETRY FOR BAFFLE BLOCKS IN HYDRAULIC JUMPS,
Texas A and M Univ., College Station.
D. R. Basco.
Proceedings, 14th Congress of the International Association of Hydraulics Research, Vol. 2, Paris France, p. 142-148, Aug-Sept 1971. 5 fig, 6 ref.

Descriptors: *Baffles, *Geometry, *Hydraulic jump, *Hydraulic structures, Hydraulic models, Energy dissipation, Geometric shapes, Tailwater, Depth, Theoretical analysis, Non-uniform flow.
Identifiers: *Baffle blocks, *Drag-force, Energy dissipators, Water surface profiles, Wave height.

Baffle blocks properly placed in a hydraulic jump improve performance characteristics. The block geometry usually has been developed by hydraulic model tests; now an experimental technique enables the designer to determine the block geometry through knowledge of the drag forces on the baffle blocks. The maximum drag force consistent with a desirable water surface profile is the basic optimization criterion. Minimum jump lengths and low downstream wave heights also indicate the quality of performance. Block location, height, width, spacing, second-row location, and shape were investigated for Froude numbers from 3 to 10. For data correlation, a drag force ratio using the free jump, sequent depth pressure force proved more practicable than a classical drag coefficient. Resultant downstream water depths computed using the measured drag force compared favorably with the experimentally measured values. (USBR)
W72-11358

THE MAGNITUDE OF SHEAR STRESSES ACTING ON THE BOTTOM OF OPEN CHANNELS BY PROPAGATING SURGE WAVES,
Slovenska Akademie Vied, Bratislava (Czechoslovakia).
V. Strauss.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol. 2, Paris, France, p. 159-167, Aug-Sept 1971. 5 fig, 7 ref.

Descriptors: *Shear stress, *Open channel flow, *Instrumentation, Measurement, Shear, Propagation, Surges, Open channels, Unsteady flow, Shear forces, Hydraulic transients, Hydraulic models, Transducers, Canals, Laboratory tests.
Identifiers: *Direct shear, *Surge waves, Czechoslovakia, Test results.

The problems associated with direct shear measurement in unsteady flow on the wetted area of a channel are analyzed. A new device measures directly the time course of the shear stress near the point of the wetted area in unsteady flow conditions. The measuring equipment consists of a transducer, a measuring and registering device, and a calibrating device. Laboratory experiments confirmed the advantage of using the device for measuring shear stresses on the channel in unsteady flow conditions. The following conclusions are based on the experimental results: (1) Oscillation period of the shear stress is the same as the oscillation of the wave level. (2) A phase difference occurs between oscillations of the free surface and of the shear stress. (3) At various parameters of the wave, the value of the shear stress after passing of the peak may be much greater than the value of the shear stress of the initial steady flow. (USBR)
W72-11359

INFLUENCE OF DRAFT TUBE SHAPE ON SURGING CHARACTERISTICS,
Bureau of Reclamation, Denver, Colo.
U. J. Palde.
Preprint, American Society of Civil Engineers National Water Resources Engineering Meeting, Atlanta, Ga., Jan 1972. 25 p, 14 fig, 13 ref, 2 append.

Descriptors: *Draft tubes, *Surges, *Geometry, *Shape, Hydraulic turbines, Analysis, Hydraulic structures, Model tests, Resonance, Fluid mechanics, Hydraulic design, Vibrations, Properties, Hydrodynamics, Fluid flow, Pulsating flow, Laboratory tests, Vortices.
Identifiers: Friction coefficient, Experimental data, Natural frequency.

Draft tube surges were noted in hydroelectric plants before the surging was found to be caused by a flow phenomenon known as vortex breakdown. During 1940, Rheingans summarized experiences and presented an equation for estimating

the expected frequency of surging. Investigators now accept the fact that the draft tube surge is a hydrodynamic instability occurring in the draft tube as a result of rotation remaining in the fluid as it leaves the turbine runner and enters the draft tube throat. Experimental analysis and laboratory procedures are discussed. Draft tube shapes were studied and surge data obtained for over 50 distinct draft tube shapes. Conclusions are: (1) degree of divergence of a draft tube is the most significant geometric feature affecting surging characteristics; (2) surging can be minimized by using an equivalent expansion angle of about 15 deg through the entire length of the draft tube; and (3) resonance with known natural frequencies of other features of the powerplant can be checked using results presented. Resonance can be avoided by selecting proper geometric components in draft tube design. (USBR)
W72-11365

NON-DIMENSIONAL SURGE TANK ANALYSIS,
Washington State Univ., Pullman.
C. N. Lin, and J. S. Gladwell.
International Journal of Numeric Methods Engineering, Vol. 4, No. 1, p. 23-37, Jan-Feb 1972. 6 fig, 5 tab, 6 ref, 3 append.

Descriptors: *Surge tanks, *Analysis, Surges, Valves, Computer programs, Pressure conduits, Fluids, Numerical analysis, Head loss, Mathematical anlysis, Fluid mechanics, Hydraulic structures, Hydraulic transients.
Identifiers: *Runge-Kutta method, *Computer applications, Computer-aided design, Closures, Load rejection.

The basic principles of surge tank operation have been known for decades, but the literature has emphasized arithmetical and graphical solutions because of the nonlinearity of the operation. A computer program for surge tank analysis is presented. The computer output provides a complete history of water level within the surge tank and of the fluid velocity within the pressure conduit from the time valve closure is initiated. The governing equations are solved by a third-order Runge-Kutta procedure. Head losses in the pressure conduit and in the surge tank constriction are accounted for in the formulation of the equation. The nondimensional form of the governing parameters makes the program more usable for preliminary design. (USBR)
W72-11370

SLOPE-DISCHARGE RATINGS FOR CUTTHROAT FLUMES,
Colorado State Univ., Fort Collins.
G. V. Skogerboe.
Paper 71-746, 1971 Winter Meeting American Society of Agricultural Engineers, Chicago, Ill. Dec 1971. 28 p, 11 fig, 3 tab, 5 ref.

Descriptors: *Slope angles, *Discharge (Water), *Discharge coefficient, *Flumes, *Flow measurement, Effects, Floors, Hydraulic design, Hydraulic models, Hydraulic structures, Hydraulics.
Identifiers: *Cutthroat flumes, *Slope angles, Test results, Free flow, Submerged flow, Flow depth.

Frequently, flow measuring flumes in unlined channels settle at the exit end. The settlement is caused by uncorrected scouring action. Laboratory studies evaluated the effect of floor slope on the discharge ratings of rectangular cutthroat flow measuring flumes under both free flow and submerged conditions. Results indicated that the discharge coefficient (thereby the discharge) changes considerably as the downward slope of the flume floor is increased. Both the free flow exponent and submerged flow exponent have a unique value for each flume length and are not affected by throat width or flume floor slope. The effects of flume floor slope can be analyzed in terms of the free flow coefficient and submerged flow coefficient. These coefficients have a unique relation with flume floor slope for each flume length. (USBR)
W72-11373

THE HYDRAULICS OF SPATIALLY VARIED FLOW IN AN IRRIGATION DISTRIBUTION CHANNEL WITH FURROW OUTLETS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W72-11384

CONTRIBUTIONS TO THE THEORY OF WATER WAVES ON A SLOPING BEACH,
Wisconsin Univ., Madison. Dept. of Mathematics.
For primary bibliographic entry see Field 02E.
W72-11389

CHESAPEAKE BAY HYDRAULIC MODEL, MATAPEAKE, MARYLAND (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as PB-201 531D, $3.00 in paper copy, $0.95 in microfiche. June 15, 1971. 8 p, 1 map.

Descriptors: *Research facilities, *Model studies, *Chesapeake Bay, *Environmental effects, *Hydraulic models, *Laboratory tests, Testing, Hydraulic engineering, Currents (Water), Alternate planning, Analytical techniques, On-site laboratories, Facilities, *Maryland, Project planning, Bulkheads, Bridges, Breakwaters, Jetties.
Identifiers: *Environmental Impact Statements, *Matapeake (Md).

The project would provide for the construction of a shelter to house an hydraulic model for Chesapeake Bay and surrounding waters at Matapeake, Maryland. The model will be used to predict the effect of alterations such as decreasing freshwater input from the tributaries; deepening channels into the major ports; deepening the Chesapeake and Delaware Canal; creating islands; and building bridges, bulkheads, breakwaters, and jetties. The model will be able to duplicate water currents, river volumes, salinities, temperatures, and bottom geometry as they exist in nature. Environmental impact of the proposed action would include reduction in percolation of precipitation due to the removal of vegetation and construction of a 14.5 acre building, changes in the use of the site from wooded space to a research and educational facility, and possible sedimentation during construction. Adverse environmental effects would include some depletion of available freshwater supply due to operation of the hydraulic model, and localized shifts in estuarine plants and animals due to the discharge of saline water into the Bay. Alternative sites were considered and rejected. (Widman-Florida)
W72-11557

SOME FACTORS AFFECTING FLOW INTO DRAINPIPES,
California Agricultural Experiment Station, Davis.
J. N. Luthin, and A. Haig.
Hilgardia, Vol 41, No 10, p 235-245, February 1972. 6 fig, 6 tab, 5 ref. OWRR A-031-CAL (3).

Descriptors: *Subsurface drains, *Flow characteristics, *Drains, *Pipes, Testing, Analytical techniques, Flow rates, Water table, Fluid mechanics, Head loss.
Identifiers: Controlled experiments.

Factors influencing flow into subsurface drainpipes were investigated in an experimental tank. Doubling the drain diameter from 2 to 4 inches increased the flow 35% to 60%. An increase of drain diameter from 2 to 7.48 inches caused a 90% to 130% increase in flow depending on the water-table height. Decreasing pipe-segment length from 3 to 1 foot increased the rate of flow into the pipe by 2.5 times. Discharge rates are greater when the holes are at the bottom of the pipe because of the greater hydraulic head. When outflow is adjusted for the hydraulic head there is no difference due to location of holes. In all the measurements, except for the largest drain and for the lowest reservoir level, the water table did not intersect the drain but was above it even though the drains were not running full. The only observable effect of various water levels in the drains was due to a slight change in the total hydraulic head. The effect was negligible. Flow into the drains was directly proportional to water-table height at the midpoint. (Woodard-USGS)
W72-11655

NATIONAL SHORELINE STUDY--TEXAS COAST SHORES REGIONAL INVENTORY REPORT.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 02J.
W72-11674

8C. Hydraulic Machinery

APPARATUS AND METHOD FOR REMOVING FLOATING POLLUTANTS FROM A BODY OF WATER,
For primary bibliographic entry see Field 05G.
W72-11137

APPARATUS FOR REMOVAL OF OIL FLOATING ON WATER OR THE LIKE,
Gulf Research and Development Co., Pittsburgh, Pa.
For primary bibliographic entry see Field 05G.
W72-11154

POLLUTION CONTROL DEVICE,
For primary bibliographic entry see Field 05G.
W72-11155

SEWAGE TREATMENT STRUCTURE,
FMC Corp., San Jose, Calif.
For primary bibliographic entry see Field 05D.
W72-11157

METHOD AND APPARATUS FOR RECOVERING IMPURITIES FROM THE SURFACE OF A LIQUID,
Tetradyne Corp., Dallas, Tex.
For primary bibliographic entry see Field 05G.
W72-11160

FPC PROJECT NO. 1121--BATTLE CREEK HYDROELECTRIC PROJECT, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Pacific Gas and Electric Co., San Francisco, Calif.

Available from the National Technical Information Service as PB-199 496D, $3.00 in paper copy, $0.95 in microfiche. October 30, 1971. 47 p, 4 map, 4 dwg, 4 tab, 3 append.

Descriptors: *California, *Permits, *Hydroelectric plants, *Environmental effects, Administrative agencies, Powerplants, Electric powerplants, Project planning, Recreation, Multiple-purpose projects, Hydroelectric power, Water resources development, Streams, Productivity, Reservoir storage, Replacement costs.
Identifiers: *Environmental impact statements.

The redeveloped Battle Creek Project will consist of four new power plants as replacements for four older plants. The project area is located 35 miles east of Redding, California. Continued operation of the project will maintain the present environmental equilibrium. Licensee's development plan

proposes improving and expanding the recreational opportunities afforded by the project. There would be no adverse effects on environmental quality resulting from the continued operation of the project. One alternative to the issuance of a license would be continued operation of the existing project under the present license until the facilities are no longer useful. Past usage of the project area has not adversely affected the productivity of the area. Similarly, long term use would not adversely affect such productivity. Continued operation of the project does not involve any irretrievable commitment of resources. (Waldron-Florida)
W72-11174

SECOND POWERHOUSE, BONNEVILLE LOCK AND DAM, COLUMBIA RIVER, OREGON AND WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.

Available from the National Technical Information Service as PB-202 125D, $3.00 in paper copy, $0.95 in microfiche. August 5, 1971. 28 p, 1 plate, 1 photo.

Descriptors: *Columbia River, *Bonneville Dam, *Environmental effects, *Hydroelectric plants, Multiple-purpose projects, Dam construction, Excavation, Rock excavation, Backfill, Water resources development, Relocation, Highway relocation, Turbidity, Fish migration, Fish ladders, Fish management, Dams, Project planning.
Identifiers: *Environmental Impact Statements.

The proposed project will involve construction of an eight-unit powerhouse at the existing Bonneville Dam project on the Columbia River, 42 miles east of Portland, Oregon. The powerhouse will have a capability of using 160,000 cubic feet per second of water, with a dependable capacity of 560 mega watts. Existing power lines and navigation facilities will not require alteration. Environmental impacts include highway and railroad relocations, removal of the town of North Bonneville, excavation of 18 million cubic yards of material, increased dependable electrical energy production, and fish migration disturbance due to streamflow alteration. Adverse impacts would include residential relocations, filling of 400 to 600 acres of low elevation area, temporary turbidity during construction, and noise and air pollution associated with construction. Alternatives include no development, different sized powerhouse, different powerhouse location, different powerhouse operation, and different power sources. (Grant-Florida)
W72-11261

HYDRODYNAMIC FORCES ON SINGLE INTAKE GATES,
Worcester Polytechnic Inst., Holden, Mass; and Tennessee Valley Authority, Norrsi. Engineering Lab.
G. F. Hecker, and R. A. Elde.
Proceedings, 14th Congress of the International Association for Hydraulics Research, Vol 2, Paris, France, p. 229-238, Aug-Sept 1971. 10 fig.

Descriptors: *Intake gates, *Friction, Hydraulic gates, Hydraulic models, Gate hoists, Gate seals, Intakes structures, Geometry, Discharge (Water), Hydrodynamics, Hydraulic structures, Hydraulic machinery.
Identifiers: *Gate lips, *Model tests, *Emergency closures, Friction coefficient, Hydrodynamic pressure.

TVA's Tims Ford Project will use a single lift gate to effect emergency closure for the 40-mw hydroelectric unit. Model tests were conducted to ensure that the gate would function as an emergency closure device at flows up to the estimated turbine funaway discharge. These tests included investigation of the effects on the hydrodynamic and cable forces of varying intake geometry, lower gate lip angle, speed of gate closure, gate friction, initial discharge, and quantity of air venting. From online analog computer components, used to eliminate the known model friction variation, prototype cable forces were computed for a range of expected gate friction coefficients. These data indicated that some design parameters, such as the intake shape and gate friction, had pronounced effects on the gate performance; other parameters, such as speed of closure and air-venting, had no major effects. (USBR)
W72-11360

PROGRESS AND PROSPECTS FOR UNDERGROUND TRANSMISSION,
Westinghouse Electric Corp., East Pittsburgh, Pa.
C. J. Baldwin, and L. A. Kilar.
Proceedings, American Power Conference, Vol. 33, p 924-934, 1971. 6 fig, 1 tab, 5 ref.

Descriptors: *Costs, *Losses, *Limiting factors, Heat, Heat transfer, Economics, Water cooling, Electrical insulation, Electric potential, Electric current.
Identifiers: *Underground cables, *Underground transmission lines, *Transmission dielectrics, Capacitance, Dielectric absorption, Limiting current density.

A survey of the progress to date of underground transmission technology and an assessment of future prospects currently being explored are presented. Principal technical barriers prohibiting increases in voltage and power ratings of underground systems are identified and discussed. A summary of the power-handling capability of today's most popular types of cable is given. New concepts for underground transmission are presented, and major problems are given to indicate the need for aggressive research programs. A characteristic common to all underground transmission systems is high cost of materials and installation. Typical costs of underground vs. overhead systems are difficult to estimate, but ratios of from 10:1 to 30:1 for facilities having equal power-handling capabilities are common. Further developments in underground systems must be aimed at substantial cost reductions. Substantial breakthroughs will be necessary if underground transmission systems are to compete technically or economically with overhead transmission. (USBR)
W72-11372

A LABORATORY INVESTIGATION OF DISPERSION OF THE JET FROM A FIXED--CONE JET-DISPERSION VALVE DISCHARGING INTO A BODY OF WATER,
Department of Works, Canberra (Australia).
R. F. Goldfinch.
Institution of Engineers, Australia, Civil Engineers Transactions, Vol CE13, No 2, p 79-86, Oct 1971. 6 fig, 3 tab, 8 ref, append.

Descriptors: *Laboratory tests, *Dispersion, *Jets, *Penetration, Energy dissipation, Vibrations, Noise (Sound), Regulated flow, Velocity, Hydraulic valves, Hydraulic design, Hydraulic machinery, Theory, Impact, Valves.
Identifiers: *Howell-Bunger valve, *Jet diffusion, Small reservoirs, Valve vibration, Australia, Needle valves, Test results.

An investigation was made by the Melbourne and Metropolitan Board of Works to find a valve system suitable for discharging water downward at a high velocity into service reservoirs. The investigation showed that fixed-cone jet dispersion valves discharging into the atmosphere under controlled conditions may be used to deliver water into service reservoirs without causing severe vibration, noise, spray, or cavitation. The energy of a high velocity jet discharging downward from a fixed-cone jet dispersion valve can be dissipated in a relatively confined volume of water without using a special energy-dissipating structure. Methods are given for determining the shape and dimensions of the dispersion zone in which the energy of the jet is dissipated, and the average velocity of the jet at any likely point of impact with the floor or sides of the reservoir. Optimum performance of the 90 deg cone type valve can be achieved when the ratio, height of the apex of the cone above the surface of water in the reservoir to jet thickness, is about 60 for the valve fully opened. (USBR)
W72-11379

INVESTIGATION OF NONMETALLIC WATERSTOPS: REPORT 8. EFFECT OF SPECIMEN SIZE AND LOW TEMPERATURE ON WATERSTOP TEST RESULTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. Houston.
Available from NTIS, Springfield, Va 22151 as AD-737 174, Price: $3.00 paper copy; 95 cents microfiche. Technical Report No 6-546, January 1972. 30 p, 2 fig, 1 tab, 5 photo, 4 plate, 8 ref.

Descriptors: *Hydraulic structures, *Sealants, *Dams, *Design criteria, *Laboratory tests, Water conveyance, Outlets, Joints (Connections), Analytical techniques, Stress, Tensile strength, Plastics, Rubber, Pipes.
Identifiers: *Waterstops, Nonmetallic waterstops.

Six nonmetallic waterstops were tested for standards criteria, including two- and three-bulb shapes of natural rubber and polyvinylchloride (PVC), a three-bulb neoprene, and a corrugated flange shape PVC. Standard dumbbell specimens, 2-in-long sections of the finished waterstop cut in a transverse direction, and 2-in-long sections embedded in concrete blocks were tested for tensile strength and elongation at 73, 20, and 0 deg F. Specimens of these three types were also stressed to 90% of ultimate eleongation at 73 deg F, then placed in a controlled temperature room at -15 deg F for 2 weeks. Tensile strengths of PVC at 0 deg F were increased 45% to 105% and ultimate elongations were decreased 30% to 70% compared with results obtained at 73 deg F. The same trend was evident for neoprene and natural rubber, but was not nearly as pronounced. The tensile strengths of the 2-in-long full-width PVC specimens averaged about 25% lower than those of small dumbbells, while those of full-width rubber specimens were 40% to 50% lower than those of small dumbbells. Strengths of 2-in-long specimens pulled by use of special grips and those embedded in concrete were roughly the same. Ultimate elongation of 2-in-long PVC and rubber specimens averaged about 60% and 18%, respectively, lower than those of small dumbbells. Reducing temperature of the PVC and rubber specimens stressed to 90% of ultimate elongation to -15 plus or minus 2 deg F did not cause any failures. (Woodard-USGS)
W72-11465

GRAHAM BURKE PUMPING PLANT, ARKANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.

Available from the National Technical Information Service as PB-202 305D, $3.00 in paper copy, $0.95 in microfiche. July 1971. 13 p, 1 fig, 1 map, 2 photo.

Descriptors: *Arkansas, *Environmental effects, *Flood control, *Pumping plants, Water pumping, Flood plains, Levees, Flood protection, Wildlife habitats, Aquatic habitats, Hunting, Fishing, Air pollution, Alluvium, Land clearing, Drainage, Gravity.
Identifiers: *Environmental impact statements, *White River (Ark).

The pumping plant was constructed to evacuate impounded water runoff and seepage during periods when stages on the White River will not permit gravity drainage. The plant is located in Phillips County, Arkansas, and is designed to aug-

ment gravity discharge from alluvial lands protected by a levee system. The environmental impact resulting from plant operation includes minor air pollution from diesel motors used to operate pumps, reduced flood damages and improved drainage, and enhancement of fishing and hunting due to new sump elevations. Adverse environmental impacts will result if water is allowed to rise too high in the sump area causing flooding of farm land. If the water level falls too low waterfowl will be affected. The only other adverse effect would be air and noise pollution from the diesel engines. The only alternatives are to not operate the plant or to modify the schedule of elevations to be maintained. (Grant-Florida)
W72-11514

AN APPLICATION FOR MAJOR LICENSE FILED BY APPALACHIAN POWER COMPANY FOR CONSTRUCTED BYLLESBY AND BUCK HYDROELECTRIC PROJECT NO. 2514-VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 08A.
W72-11535

8D. Soil Mechanics

SMITHVILLE LAKE, LITTLE PLATTE RIVER, MISSOURI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.

Available from the National Technical Information Service as PB-202 291D, $3.00 in paper copy, $0.95 in microfiche. August 2, 1971. 12 p, 4 tab.

Descriptors: *Missouri, *Environmental effects, *Dam construction, *Multiple-purpose projects, Flood control, Reservoir construction, Impounded waters, Impoundments, Water supply, Wildlife habitats, Aquatic habitats, Water quality, Recreation, Runoff, Rivers, Flood protection, Flood plains, Earth dams.
Identifiers: *Environmental impact statements, Little Platte River (Mo).

The project will involve construction of an earth-filled dam and lake in Clay and Clinton Counties, Missouri. The project will control runoff from a drainage area of 213 square miles and provide flood control, water quality, water supply, recreation and improved fish and wildlife habitats. Environmental impacts will include flood protection, inundation of agricultural land and fish and wildlife habitat, increased urbanization downstream, intensified agricultural use causing wildlife destruction, and mudflat development in the upper reaches of the lake. Adverse impacts will include habitat destruction from inundation and expected urbanization and agricultural use, soil erosion, and noise and equipment exhaust emmissions occurring during construction. Alternatives include pumping water from the Missouri River as a water source and constructing a smaller single-purpose reservoir. These are unacceptable due to cost and inflexibility. (Grant-Florida)
W72-11177

VANDALIA DRAINAGE AND LEVEE DISTRICT (DISTRICT 21), ILLINOIS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Louis, Mo.

Available from the National Technical Information Service as PB-202 910D, $3.00 in paper copy, $0.95 in microfiche. June 1, 1971. 31 p, 4 tab.

Descriptors: *Illinois, *Channel improvement, *Environmental effects, *Flood protection, Flood control, Levees, Environmental structures, Environmental engineering, Stream stabilization, Comprehensive planning, Coordination, Multiple purpose projects, Project planning, Cost-benefit analysis, Economic impact, Dredging.
Identifiers: *Environmental Impact Statements.

The project is designed to improve flood protection and interior drainage in Fayette County, Illinois. The plan of improvement consists of construction of an earth levee, limited channel improvements, two diversion ditches, and a pumping station. The proposed improvements will reduce the average area of cultivated lands flooded annually from 5770 acres to 210 acres. Approximately 460 acres of brush and forest land will be converted to cropland. Approximately 3000 feet of the natural channel of the Kaskaskia River will be removed by channel straightening to provide necessary channel stabilization. The conversion of brush and forest land in the district to cropland will have a depressing effect on the already limited small game habitat. Alternative studies included no structural improvements, levee alignments, impoundments, diversions, pumping stations, and various combinations of these developments. An economic analysis of the project is included. (Widman-Florida)
W72-11263

EXPERIMENTAL STUDIES IN SOIL-STRUCTURE INTERACTION,
Colorado State Univ., Fort Collins.
F. D. Nielson.
Paper, 51st Annual Meeting Highway Research Board, Washington, D.C. Jan 1972. 54 p, 24 fig, 19 ref.

Descriptors: *Steel pipes, *Pipes, Pipelines, Culverts, Deflection, Soil compaction, Stress, Construction methods, Pressure distribution, Soil density, Buckling, Moisture content, Pressure, Reviews, Bibliographies, Soil mechanics, On-site investigations.
Identifiers: *Buried pipes, *Pipe design, *Pipe tests, Test results, Soil-structure interaction, Imperfect ditch method, Soil modulus, Iowa formula, Photoelastic analysis, Spangler formula.

This literature review of experimental studies pertaining to soil-pipe interaction is divided into 2 parts: model studies, and field or fullscale tests. Requirements governing model studies are reviewed briefly and examples presented. Results of several pipe studies using model analyses are discussed, including: (1) effects of soil moisture and density on culvert deflection, (2) effects of differential soil compaction on culvert stresses, (3) imperfect ditch method of construction, (4) stresses on multiple pipe installations, (5) pressure distribution on pipe, and (6) soil properties. Field studies of the imperfect ditch method of construction, full-scale failure tests, and certain Canadian large pipe tests are discussed. A design method presented for circular culverts takes into account most of the variables affecting culvert performance. If the tests had been properly instrumented, much of the research work previously performed on pipe would have been of more value. (USBR)
W72-11368

PENN'S LANDING, DELAWARE RIVER, PENNSYLVANIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.

Available from the National Technical Information Service as PB-204 013D, $3.00 in paper copy, $0.95 in microfiche. October 18, 1971. 13 p, 1 illus, 1 append.

Descriptors: *Pennsylvania, *Delaware River, *Environmental effects, *Landfills, *Land use, Environmental engineering, Land forming, Administrative decisions, Coordination, Comprehensive planning, Alternate planning, Multiple-purpose projects, Project planning, Land development, Legislation, Navigable waters, Non-navigable waters.
Identifiers: *Environmental Impact Statements.

The Penn's Landing development site is situated along the Delaware River in downtown Philadelphia. Legislation has been introduced in Congress (H.R. 2450, 92d Congress S. 1971) to declare this portion of the Delaware River non-navigable. Stage 1 of the project required 2.4 million cubic yards of fill which was obtained from the bed of the Delaware River in project vicinity. Approximately twice this amount of material will be necessary to complete Stages 11 and 111. Source of this remaining fill is not known at this time. Adverse environmental effects include permanent removal of 110 acres of navigable water and conversion to filled lands in order to open the site to recreational, institutional, residential and employment purposes. The only alternative to the project is no development, which will result in continued deterioration of this section of the port. The only irreversible commitment of resources will be a change of this area from a marine oriented area to essentially a land use area. A copy of H.R.2450 is included. (Widman-Florida)
W72-11526

8F. Concrete

JORDAN AQUEDUCT, BONNEVILLE UNIT, CENTRAL UTAH PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 08A.
W72-11181

DETAILED PROJECT STUDY OF FLOOD CONTROL IMPROVEMENTS FOR WAIMANO STREAM, OAHU, HAWAII (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.

Available from the National Technical Information Service as PB-198 882D, $3.00 in paper copy, $0.95 in microfiche. April 16, 1971. 6 p, 1 map.

Descriptors: *Hawaii, *Environmental effects, *Flood control, *Channel improvement, *Concrete-lined canals, Reinforced concrete, Concrete construction, Canal construction, Sediment control, Flood protection, Sedimentation, Decision making, Turbidity, Stream improvement, Project planning, Canal linings.
Identifiers: *Environmental impact statements, Waimanu Stream (Hawaii).

The project is designed to provide flood protection to the southern coast of the island of Oahu. The project would substitute a reinforced concrete lined waterway for an inadequately lined, low capacity CRM channel. The proposed channel will control all floods up to a design flood of 5,600 cfs, which event is expected to occur about once every 100 years. During project construction, stream water would be discolored and turbid, but the long-term reduction in sediment transport into the estuary outweighs the short-term adverse effects. The alternative of no action was considered unacceptable because it would not improve the well-being of the area's populace. Other alternatives were found to be economically unfeasible and do not appear to offer environmental advantages over the proposed plan. Resources which would be of an irreversible and irretrievable nature are the labor and materials associated with the construction. (Widman-Florida)
W72-11182
For primary bibliographic entry see Field 08A.
W72-11191

WYNOOCHEE DAM AND LAKE, WYNOOCHEE RIVER, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W72-11192

THE WORKABILITY OF CONCRETE SUBJECTED TO VIBRATION,
Birmingham Univ. (England).
B. P. Hughes.
Cement and Concrete Research, Vol. 2, No. 1, p. 101-122, Jan 1972, 7 fig, 4 tab, 20 ref.

Descriptors: *Concretes, *Aggregates, *Concrete mixes, Concrete properties, Concrete construction, Bibliographies, Forecasting, Concrete technology, Portland cements, Coarse aggregates, Concrete tests, Concrete placing, Fine aggregates, Vibrations, Gradation, Shape, Density, Cements.
Identifiers: *Work ability, Concrete compaction, Mix ratios, Great Britain, Vibratory compaction, Vibration tests.

An accurate relation has been established which clearly indicates how the workability of concrete, placed using vibration, is affected by the following variables: (1) mix proportions; (2) type, grading, and maximum size of coarse aggregate; (3) type and grading of fine aggregate; and (4) type of cement. Each variable has been related to a clearly defined physical test on the aggregate or cement. Comprehensive but simple to apply charts are derived to accurately predict the effect of any variable upon the Vebe time. An examination of the charts provides rational explanations, in quantitative terms, for many of the practical observations of the effects of each variable on concrete workability which have formerly had to receive a qualitative description only. (USBR)
W72-11366

AERATION MITIGATES CAVITATION IN SPILLWAY TUNNEL,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 08A.
W72-11367

CONCRETE FOR LONG-TIME SERVICE IN SULFATE ENVIRONMENT,
Bureau of Reclamation, Denver, Colo.
G. L. Kalousek, L. C. Porter, and E. J. Benton.
Cement and Concrete Research, Vol. 2, No. 1, p. 79-89, Jan 1972. 1 fig, 3 tab, 4 ref.

Descriptors: *Concretes, *Pozzolans, Concrete testing, Criteria, Fly ash, *Concrete technology, Failure (Mechanics).
Identifiers: *Concrete deterioration, *Sodium sulfate tests, *Sulfate attack, *Service life, Sulfate-resisting cements, Wetting and drying tests, Accelerated tests, Water-cement ratio, Test results.

Concrete designed to resist sulfate attack may remain stable for only a few years, several decades, or indefinitely. These variations in the behavior of high quality concrete made with Type II and Type V cements prompted the Bureau of Reclamation to undertake a long-term research program of the sulfate problem. Investigations included effects of pozzolans, water and cement contents, admixtures, and moist curing and drying. To predict service life, concrete samples were soaked continuously in a 2.1% sodium sulfate solution and then alternately soaked and dried. 84% of the concrete samples made with Type II and Type V cements showed life expectancies of less than 50 yrs. Concretes containing different pozzolans showed a spectrum of effects ranging from deleterious to highly beneficial. 27 of 33 pozzolan concrete samples had life expectancies of more than 50 yrs. Concrete made with fly ash, pumice, and 2 calcined products had markedly improved sulfate resistance. Some concretes containing fly ash had a life expectancy of over 100 yrs. For long-time survival in a sulfate environment, concrete should be made with high quality pozzolans and a sulfate-resisting cement. Use of pozzolan should preferably not increase the water requirements. (USBR)
W72-11369

POLYMER LATEX MODIFIED MORTAR,
Inst. of Tech., Cambridge; and Illinois Univ., Chicago.
S. A. Frondistou-Yannas, and S. P. Shah.
Journal of the American Concrete Institute, Proceedings, Vol. 69, No. 1, p 61-65, Jan 1972. 4 fig, 4 tab, 12 ref.

Descriptors: *Mortars, *Portland cements, *Emulsions, Bonding, Durability, Surface sealing, Modulus of elasticity, Compressive strength, Curing, Flexural strength, Tensile strength, Sealants, Coatings, Concrete technology, Polymers, Chemical compounds.
Identifiers: *Polymer concretes, Polyvinyl acetate, Latex, Extensibility, Copolymers, Bondings strength, Sulfate-resisting elements, Volume change.

Polymer latex modified mortars are portland cement mortars to which polymer latex emulsions have been added during mixing. Mechanical and durability properties of modified mortars, the effects of curing history on modified mortars and latex films, and bond strength of modified mortar to plain mortar were studied. Because of significant improvements in extensibility, bonding properties, and durability, mortar modified by latex emulsion may be used for surface coatings, pavement toppings, and patching damaged concrete. Higher volume changes during wetting and drying, lower modulus of elasticity, and lower compressive strength were observed for modified mortars. Although continuous wet curing reduces the strength of modified mortars, subsequent drying increases strengths. For polyvinyl acetate emulsions, this phenomenon was partly explained by the performance of latex films in saturated lime solutions. Three polymer latex emulsions were used: (1) modified polyvinyl acetate (PVA) copolymer, (2) copolymer of polyvinyl acetate and dibutyl maleate, and (3) sytrene-butadiene emulsion. The ratio of polymer solids to emulsion water was approximately 50% by weight; the polymer-cement ratio was 0.20 by weight. (USBR)
W72-11375

COST FACTORS FOR CAST-IN-PLACE ARCHITECTURAL CONCRETE,
Gensert (R. M.) Associates, Cleveland, Ohio; and Carnegie-Mellon Univ., Pittsburgh, Pa.
R. M. Gensert.
Journal of the American Concrete Institute, Proceedings, Vol. 69, No. 1, p 36-45, Jan 1972. 14 fig, 1 photo, 1 tab, append.

Descriptors: *Cost comparisons, *Concretes, *Concrete construction, *Costs, Cements, Aggregates, Geometry, Structural shapes, Beams (Structural), Coatings, Cast-in-place structures, Formwork (Construction), Texture, Walls, Structural members, Architecture, Building materials, Construction materials, Columns.
Identifiers: *Architectural concrete, Structural concrete, Colored concrete.

Costs of architectural cast-in-place concrete are evaluated with charts and curves giving percentages of increase over costs of conventional structural concrete. Factors affecting the costs include: cements, aggregates, effect of overall surface geometry, surface indentations and projections, reveals, and soffits. Beam and column cross sections and profiles are based on relative costs, using linear members as the basic measure. Coloring, using pigments, is based on cost per cu yd of concrete; coloring by coatings is based on sq ft of surface coated. Texture of major form variations or form liners, or surfaces applied or removed is indicated as a cost per sq ft of surface affected. Suggestions on form tolerances and construction are included. (USBR)
W72-11378

PROPOSED CONCRETE LINING OF MAIN OUTLET DRAIN, SOUTH GILA VALLEY, COLORADO RIVER FRONT AND LEVEE SYSTEM, ARIZONA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nevada. Region 3 Office.
For primary bibliographic entry see Field 08A.
W72-11560

8I. Fisheries Engineering

ABUNDANCE AND DISTRIBUTION OF FINGERLING LARGEMOUTH BASS, MICROPTERUS SALMOIDES. AS DETERMINED BY ELECTROFISHING, AT LAKE NACIMIENTO, CALIFORNIA,
California State Dept. of Fish and Game, Sacramento.
C. E. Von Geldern, Jr.
Calif Fish Game. Vol 57 No 4 p 228-245. 1971.
Identifiers: Abundance, *Bass, California, *Distribution, Dorosoma petenense, Fishing, Micropterus salmoides, Lake Nacimiento (Calif).

Electrofishing gear was used for 4 consecutive summers at Lake Nacimiento to obtain data on the abundance and distribution of fingerling largemouth bass. Mean catches of fingerling bass per 1/4 m of shoreline were extremely variable, ranging from a low of 3.2 in 1968 to a high of 129.9 in 1967. Ninety-five percent confidence intervals about the means ranged from plus or minus 22.7 to plus or minus 46.7%. Factors associated with large fingerling bass year classes were: stable or rising water levels during the spawning period; high surface water elevations in April and May; and low abundance of adult threadfin shad (Dorosoma petenense). No relation between fingerling bass abundance and the abundance of spawners, yearling bass, or other game fish species was detected. Fingerling bass were most abundant in the westerly half of Lake Nacimiento where wind and wave action were relatively slight. The degree of shoreline slope was not a factor affecting the abundance of bass fingerlings. Shoreline sections relatively free of shelter produced larger average catches than sections containing moderate to large quantities of brush, rocks, or fallen logs.--Copyright 1972, Biological Abstracts, Inc.
W72-11328

THE WHITE PERCH IN NEBRASKA,
Nebraska Univ., Lincoln. Dept. of Zoology.
G. L. Hergenrader, and Q. P. Bliss.
Trans Am Fish Soc. Vol 100, No 4, p 734-738. 1971. Map.
Identifiers: *Fish establishment, *White perch, Morone americana, Nebraska, Ponds, Spawning, Fish hatcheries.

Sexually mature white perch (Morone americana), brought into Nebraska in the spring of 1964, spawned successfully in hatchery ponds. Some of the progeny were stocked in several of the highly alkaline lakes in the Nebraska Sandhills while others were inadvertently introduced into a turbid flood control reservoir in southeastern Nebraska. The species became established in the reservoir where it made very rapid growth and achieved sexual maturity 1-2 yr sooner than in its natural range. Over a 3 yr period the white perch completely displaced the native black bullhead as the dominant species in the reservoir. This dominance is being maintained and the white perch population is becoming stunted. During periods of reservoir discharge in the spring large numbers of white perch escape through the spillway. The stream on which the reservoir is located is tributary to the Platte River which subsequently joins the Missouri River. There appears to be no barrier to the movement of white perch through this stream system to the Missouri as they have been captured throughout the system up to a point only 18 stream m from the juncture of the Platt and Missouri rivers. It appears likely that many white perch have successfully made the journey. The future prospects of the species in the Missouri River should be interesting.--Copyright 1972, Biological Abstracts, Inc.

W72-11342

THE EFFECT OF HYPOXIA AND ANEMIA ON THE SWIMMING PERFORMANCE OF RAINBOW TROUT (SALMO GAIRDNERI),
British Columbia Univ., Vancouver. Dept. of Zoology.
D. R. Jones.
J Exp Biol. Vol 55, No 2, p 541-551. 1971.
Identifiers: *Anemia, Branchial, Cardiac, *Hypoxia, Pumps, *Rainbow trout, Salmo-Gairdneri, *Trout, Fish management.

A series of increasing water velocity tests in a water tunnel was used to investigate the maximum swimmimg performance of 2 groups of rainbow trout, 1 acclimated to high temperature (21-23 deg C) and the other to low temperature (8-10 deg C). At temperatures close to their acclimation there was no significant difference between the maximum swimming speeds of the 2 groups of trout. Exposure to an environmental O2 tension of 1/2 the air saturation value resulted in 43% reduction in maximum swimming performance at low temperature and a 30% reduction at high temperature compared with normal animals. Reduction in hematocrit to 1/2 or 1/3 normal resulted in a 34% reduction in maximum swimming speed at low temperature and a 40% reduction at high temperature compared with control animals (blank injected). The results are discussed in terms of whether fish can be assumed to be in a steady state at all velocities below the critical velocity and whether it is possible to attribute the differences in performance, during anemia and hypoxia, to increased metabolic cost of the cardiac and branchial pumps.--Copyright 1972, Biological Abstracts, Inc.
W72-11683

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

SEVENTH ANNUAL REPORT PROGRAM ACTIVITIES, JULY 1, 1970 - JUN 30, 1971.
Maryland Univ., College Park. Water Resources Research Center.
For primary bibliographic entry see Field 09D.
W72-11277

9D. Grants, Contracts, and Research Act Allotments

SEVENTH ANNUAL REPORT PROGRAM ACTIVITIES, JULY 1, 1970 - JUN 30, 1971.
Maryland Univ., College Park. Water Resources Research Center.

(1971), 135 p. OWRR A-999-MD (5).

Descriptors: *Water Resources Research Act, *Maryland, Grants, Research and development, Water resources development, Waste water treatment, Water quality, Groundwater, Hydrogeology, *Water Resources Institute.
Identifiers: *Water resources research (Md).

Summaries of allotment programs include: Treatment of Liquid Wastes from Food Processing Plants, (A-005-MD); Improvement of Quality of Water Resources by a Three-Fold Attack: Adsorption, Sedimentation and Mixing, (A-007-MD); Kinetic Studies of the Oxidative Degradation of Detergent and Related Species in Aqueous Solution, (A-009-MD); Investigation of the Public and Private Interests in the Development of the Chesapeake Bay Area, (A-010-MD); The Thermal Requirements and Tolerances of Key Estuarine Organisms, (A-011-MD); Agricultural Waste Water Accomodation and Utilization by Various Forages, (A-013-MD); Mechanism of Organic Adsorption on Activated Carbon, (A-014-MD); Physiology of Acidophilic Bacteria of Acid Mine Waters, (A-016-MD); The Transient Behavior of Recharge-Discharge Areas in Regional Groundwater Systems, (A-017-MD); A Statistical Investigation and Simulation of Hydroclimatological Events, (A-018-MD); and Pollution Loads in Percolate Water from Surface Spread Swine Wastes, (A-019-MD). Summaries of matching grant programs include: Water Quality Criteria to Protect the Fish Population Directly Below Sewage Outfalls, (B-066-MD); Effects of Economic Development Upon Water Resources, (B-007-MD); Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish, (B-009-MD); and The Effects of Thermal Loading and Water Quality on Estuarine Primary Production, (B-010-MD).
W72-11277

THE NATIONAL WATER COMMISSION ANNUAL REPORT FOR 1971.
National Water Commission, Washington, D.C.
For primary bibliographic entry see Field 06E.
W72-11527

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication AND Distribution

MATHEMATICAL MODELLING IN HYDROLOGY,
Geological Survey, Fort Collins, Colo. Water Resources Div.
For primary bibliographic entry see Field 02A.
W72-11292

REPORT ON PRECIPITATION,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02B.
W72-11293

LAKE ERIE--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 02H.
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LAKE ONTARIO--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 02H.
W72-11441

CHROMIUM IN WATER--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 05B.
W72-11442

ALDRIN AND ENDRIN IN WATER--A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C. Water Resources Scientific Information Center.
For primary bibliographic entry see Field 05B.
W72-11443

10F. Preparation of Reviews

ADVANCES IN ECOLOGICAL RESEARCH, VOL. 7.
For primary bibliographic entry see Field 06G.
W72-11524

FLAME IONISATION DETECTION (FLAME IONISATION PHENOMENA),
Ceskoslovenska Akademia Ved, Brno. Ustav Instrumentalni Analyticke Chemie.
For primary bibliographic entry see Field 02K.
W72-11726

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources management at the Center for Urban Studies of the University of Chicago.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation. Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC.

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Agricultural livestock wastes at the Department of Agricultural Engineering of Iowa State University.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agenc
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows, at the Department of Agricultural Engineering of Colorado State University.

Subject Fields

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